

The Canadian Medical Association Journal



Contents

ORIGINAL ARTICLES		PAGE		PAGE
Modern conceptions of certain immunity reactions and their practical bearing. By Horst Oertel.		289	Mercury poisoning with anaphylactic phenomena and fatal issue fifty-two days later. By A. Locke Robertson and A. Grant Fleming	342
Notes from a Canadian Hospital in the Near East. By Lieutenant-Colonel E. J. Williams, D.S.O.		303	A case of rheumatic fever with purpura, cedema of the glottis, etc. By Lionel Lindsay, M.D.	352
An experience through the Halifax disaster. By Captain Frederick T. Tooke, C.A.M.C.		308	EDITORIAL	
Analysis of clinical types of puerperal fever with special reference to prognosis and treatment. By B. P. Watson, M.D., F.R.C.S.E., F.A.C.S., and W. A. Scott, B.A., M.B.		321	Legislation for protection against venereal disease	355
The essentials of success in prostatic surgery. By Ernest M. Watson, A.M., M.D.		327	Editorial Notes	358
The establishment of a federal bureau of health. By J. B. Black, M.D.		333	THE ASSOCIATION	
CASE REPORTS			The Hamilton Meeting: Preliminary programme	361
Two cases of sinus thrombosis and jugular resection. By R. S. Minns, M.D.		336	OBITUARY	
			Lieutenant-Colonel John McCrae.	367
			MISCELLANY	
			News, Provincial	369
			News, Army Medical Service	372
			Canadian Literature	373
			Book Reviews	374
			MEDICAL SOCIETIES	
			Kingston and Frontenac Medical Society	374
			Montreal Medico-Chirurgical Society	379

TORONTO: MORANG & CO., LIMITED, PUBLISHERS

ASPIRIN

(MADE IN CANADA)

We manufacture this product and call it by the name which is official in the British Pharmacopoeia, ACETYSALICYLIC ACID.

By specifying ACETYSALICYLIC ACID M.C.W. you secure for your prescription a product which is absolutely B.P. and of the highest purity.

MALLINCKRODT CHEMICAL WORKS, of Canada, Limited
MONTREAL

Diarsenol and *Neodiarsenol*

DO you realize that the standards of test for these products are twenty per cent. higher than for the original German products?

SYNTHETIC
TORONTO



DRUG CO.
LIMITED
CANADA

The Canadian Medical Association Journal

VOL. VIII.

APRIL, 1918

No. 4

MODERN CONCEPTIONS OF CERTAIN IMMUNITY REACTIONS AND THEIR PRACTICAL BEARING

BY HORST OERTEL,

Montreal

THE subject of immunity is perhaps the most difficult to master, and certainly, the most difficult to present. It requires expert knowledge in pathology, bacteriology, physics, chemistry, and mathematics, and the vast literature which has accumulated dealing with its various branches and details, necessitates very careful study, critique, and analysis for proper understanding, interpretation, and to shape it into anything like a connected tale.

In addition to these general difficulties there exist other, more specific, ones: some investigators exhibit a peculiar desire to enlarge and generalize individual observations to new theories and swell the science with new names, instead of tracing relations and summarizing results under well-known laws. Thus, various immunity reactions such as phagocytosis and the, once famous, opsonins, have been elaborated into quite independent theories without regard to each other or to other reactions and the possibility of uniform explanation. To-day it appears that many phenomena of immunity once regarded distinct, represent only different expressions of essentially similar physico-chemical laws. I do not propose to give here a general discussion of immunity, I propose instead, to select a few of the practically most important immunity reactions, recall their foundations in the facts, develop their probable explanations and relations, and thereby make

Read at the meeting of the Montreal Medico-Chirurgical Society, January 18th, 1918.

clear their practical applications. Finally, I shall add some preliminary remarks concerning the relation of physical environment to immunity, a study which is at present being conducted by Dr. Gross and myself in the laboratories of the Royal Victoria Hospital and of McGill University.

All acquired immunity may be grouped (as generally known) under three headings or, as being represented by three phases:

First. Immobilization, anchoring of the infecting agent and its annihilation (bacteriolysis, agglutination, precipitation, phagocytosis); that is active immunity. The body takes an active part in its production.

Second. Neutralization of poisonous products (anti-toxic immunity); that may be either active or passive immunity, because it may be transferred from one individual to another.

Third. The creation of conditions which are locally or generally unfavourable to settlement or growth of infecting agents by modifying the physical and, possibly, chemical constitution of the tissues. This last one, the importance of which we are only just beginning to appreciate, is really quite distinct from the first two, for it is not a direct defense against an agent at all, but depends upon cell and tissue properties and surroundings which do not allow union of infecting agent with cells. It is the factor which is undoubtedly of the greatest importance in natural immunity. In acquired immunity the first two are only steps to reach the third. But it must be admitted that in acquired immunity the creation of conditions which are locally or generally unfavourable to settlement or growth of bacteria is not always reached, or only imperfectly. I shall postpone reference to this phase of immunity, the most interesting and, in a way, the most important one until later, as the problems of acquired immunity are best considered before approaching natural immunity.

Much of what follows will be well known to many, but is here inserted for completeness sake and for those who have been unable to keep pace with the progress of immunology.

It was in the eighties of the last century when Buchner, Flügge and Nuttall¹ made the important discovery that normal blood serum possessed the power to kill bacteria, and that this "bactericidal" property of the blood diminished with the age of the serum and could also be destroyed by exposing it to a temperature of 56°C. This was followed by the discovery of Pfeiffer that cholera bacilli injected into the peritoneal cavity of cholera-immune guinea pigs were promptly killed and dissolved. This

phenomenon, known as Pfeiffer's phenomenon, was later shown to take place in vitro as well and this, in cholera immune serum much heightened, power to dissolve cholera bacilli could be diminished or destroyed, as in normal serum, by heat. Bordet found, in addition, the important fact that serum which was thus "inactivated" by heating could be "re-activated", so as to regain its original destructive effect on bacteria, by adding any other normal serum. The same was found in regard to other bacteria and from these observations it was concluded that these specific, strong bactericidal properties of a serum immunized against specific microorganisms are due to two conditions, or as was believed, substances; the one contained in every serum, which is easily destroyed by heat; the other specific to the immune serum and stable. The first is now commonly spoken of as complement, the second as amboceptor (ambo = both, capio = I take) or antibody. Just how both of these act to produce solution of cells is a matter of discussion and does not directly concern us here. It is sufficient to remember that solution of foreign cells in an immunized body is brought about by a combined action of amboceptor and complement, which uniting, attach themselves to the specific cell against which they are directed, thereby producing its solution. Any substance which when introduced into an animal organism excites the formation of a specific antibody is known as antigen. Bacteriolysis or solution of bacteria is, therefore, spoken of as an antigen-antibody (amboceptor) complement reaction.

Bordet, continuing these researches, found that this principle does not only apply to bacteria, but to other cells foreign to an organism and that the repeated introduction of foreign cells, say red blood cells of one animal injected into another, increases the ability in the serum of the second animal to dissolve the cells injected from the first. Upon this discovery rests the principle of hæmolysis.

If we, for example, inject a rabbit several times with a few c.c. (3 to 5) of defibrinated sheep's blood, or better still, with washed red cells of the sheep, the rabbit serum acquires the property of dissolving the red blood cells of sheep and we say the rabbit has been immunized against sheep cells. In such a case the hæmoglobin passes into solution and the test tube fluid assumes a claret red hue.

The process of hæmolysis is not a destruction of red blood cells, but simply a solution of hæmoglobin from the cell discs.

These remain behind, as a pale scaffold, suspended in the fluid. Hæmolysis has been shown to follow essentially the laws of bacteriolysis, that is, in our example, the sheep cells, when introduced into the rabbit, lead to the formation of a specific amboceptor (antibody) in the rabbit which in the presence of complement dissolves the hæmoglobin from the red blood cells of sheep. If we inactivate the sheep-immune serum of the rabbit by heating it, no solution will take place, but the solution will again occur, if we should add some normal serum, because then we supply the necessary complement to cells already bound to the antibody. Such cells, which are attached to their antibody (amboceptor), but still without complement are called "sensitized".

Now a further important observation was made by Bordet, in 1901, in what is known as complement fixation, which since then has assumed very great practical importance. If we take a bacterial emulsion, say of typhoid bacilli and add its inactivated immune serum (serum from a typhoid patient) plus complement and then to this mixture of antigen-amboceptor-complement add sensitized red blood cells i.e., red blood cells with their specific, but inactivated serum, no hæmolysis will result. If, on the other hand, we take a typhoid bacillary emulsion and add normal serum plus complement and then add to this mixture of antigen-O-complement sensitized red blood cells, hæmolysis will take place. Plainly, in the first experiment antigen (typhoid bacilli) plus its amboceptor, plus complement have firmly united so that complement is no longer available for the completion of the added inactive hæmolytic system; in the second case, antigen (typhoid bacilli) no amboceptor, but only complement, the latter remains free and may then complete the added inactive hæmolytic system. In other words one antigen-amboceptor-complement combination fixes the complement firmly so that it is no longer available to complete another added inactivated system. This important discovery of complement fixation has since then been extensively used for diagnostic purposes, that is, to test whether a suspected serum contained a specific antibody or not. The hæmolytic system is introduced simply as a convenient colour indicator. If a patient's serum plus an antigen fixes complement so that sensitized blood cells which are added do not hæmolyse, the serum contains the specific antibody, the patient, therefore, passes or has passed through the suspected disease, if, on the other hand, the patient's serum plus an antigen does not fix complement so that added sensitized red blood cells undergo hæmolysis, it is

plain that the suspected serum did not contain the sought for amboceptor, the union or fixation of complement is, therefore, not accomplished and it remains in solution to complete the added sensitized red blood cells to their antigen-amboceptor-complement hemolytic system; that is, hæmolysis takes place.

Upon these observations rests the original rationale of the Wassermann reaction for syphilis: Wassermann took extracts of syphilitic organs as a convenient way of furnishing antigen; mixed these with the serum of a suspected case of syphilis in the presence of complement, then, after incubation, added sensitized red cells. It was found that under those conditions syphilitic serum fixed complement, that is, no hæmolysis took place, while normal serum did not possess that ability and hæmolysis occurred. Absence or occurrence of hæmolysis, as an indicator showed thus presence or absence of syphilitic amboceptor (antibody) in suspected sera.

There are several points which were plain from the start in relation to this and similar reactions. First, that it is strictly quantitative, so that all reagents employed, antigen, amboceptor and complement must be quantitatively titrated in order to determine their strength, before they can be employed for a reaction. Secondly, that certain technical precautions must be taken in order to obtain reliable readings. This applies particularly to the interpretation of what constitutes a positive reaction, for there are many cases in which the hæmolysis is only partial or incomplete and in which it is doubtful whether this is produced by unfixed complement or, possibly, by a certain hæmolytic property possessed by the human serum to be tested. Only the straight cut, complete occurrence or absence of hæmolysis are decisive negative or positive reactions, partial reactions, i.e., partial hæmolysis (often indicated by one plus or two plus by laboratory investigators) are not to be regarded as positive Wassermann reactions. In order to avoid these errors and to simplify the procedure various modifications of the reaction have been introduced. It follows that the physician or surgeon should have some intelligent acquaintance with the technique and manner of interpretation of the laboratory worker to understand and apply results properly. I will not enter any further upon these technical considerations,—important as they are,—for here we are concerned with the nature of these reactions, their immunological significance and practical applications. We have spoken of antigen, amboceptor and complement as though they were definite chemical

substances and reacted as such, and indeed, although the nature of these substances has always been unknown, it was generally believed until very recently that the union between antigen, amboceptor and complement is a definite chemical reaction and Ehrlich's well-known theory of immunity rests entirely on the supposition of the chemical nature of immunity. But continued observations have disclosed facts which have given complement fixation, generally, and the Wassermann reaction, in particular, a different meaning and significance. In the first place it developed, as regards the Wassermann reaction, that we are not dealing with a specific antigen, antibody, complement union. For not only syphilitic organ extracts, but alcoholic extracts of normal organs serve the purpose of fixing complement in the presence of syphilitic amboceptor. Further experiments disclosed that the essential substance or substances which fulfil the duties of antigen in these extracts are lipoids, very complex, physically fat similar substances many of which contain N. and P. as the lecithins, and that, as shown by R. M. Walker,² these lipoids need not even be animal, but vegetable, and enter, quite irrespective of their source, into antibody complement fixation. Moreover, it was found that the fixation of complement is accomplished by colloidal substances like casein, silicic acid, barium sulphate, etc., and Muir³ has demonstrated the retention of complement by the Berkefield filter, through which it passed after a time unaltered. From this and other experiments it appears that the fixation of complement is influenced by the surface of the substance to which it is fixed and in the organ extracts which are employed in antigens the surface of the suspended lipid particles plays an important rôle in the fixation of complement.⁴ Clearly, we are not dealing here with chemical reactions, but with physical phenomena characteristic of colloids, substances, which since the time of Graham have been recognized as large molecular, insoluble, non-dialysable complexes which exist in solutions either as dispersoids or emulsoids. The antigen or antigens for the Wassermann reaction have then only this in common that they are colloidal lipoids; but they are not chemical individuals. With regard to the antibody or amboceptor it has also been found that it is not exactly speaking specific, but, on the contrary, it seems to be a lipoidal complex in combination with a proteid of euglobulin nature and, therefore, also behaves as a colloid. Moreover, comparative strength reactions of antigen, amboceptor, and complement do not follow the chemical laws of multiple pro-

portions. The importance of this was early emphasized in the technique of the Wassermann reaction by Noguchi⁵; and recent investigations of R. M. Walker have further shown that the union of complement to so-called antigen and so-called antibody follows essentially the laws of adsorption; thus, when the concentration is doubled, the amount adsorbed does not equal 2, but less, namely 2 to the power $\frac{1}{N}$.

Taking all these facts into consideration it is clear that the Wassermann reaction is a colloidal adsorption phenomenon and no chemical reaction; it depends for its occurrence upon the presence of lipoidal proteid complexes in the serum of syphilitics which, when put in contact with other lipoids extracted from any lipid rich organs, possess the ability to adsorb complement. What determines the specific adsorption and fixation of these substances to each other is at present impossible to say. I will only say, as a reminder, that adsorption is essentially bound to surface tension, that is, work may be done by the surface of a liquid when the tension is able to diminish. Substances of great chemical stability only slightly lower surface tension when spread on water, some, like ether spread widely and greatly lower surface tension. Bayliss⁷ suggests that this is due to decomposition at the interface between liquid and air and between solution and a solid, or immiscible liquid. At these interfaces there is, therefore, a local accumulation of free surface energy which can be altered by the deposition of substances at the interface. From the Gibbs-Thompson law of energetics it follows that substances which lower surface tension will be concentrated in this situation, because the energy will be lessened thereby. Accordingly, any substance in solution in contact with the surface of another phase will be concentrated on that surface, if thereby the free energy present is decreased. This is adsorption and characteristic in its relation to surfaces of contact.

The exact condition controlling the adsorption of colloids are as yet not well known and also not the factors determining specific adsorption in mixtures. It is very likely that related physical configuration of molecular complexes are of importance in this respect. These considerations are not only of theoretical, but great practical importance, for the specificity of the Wassermann reaction has thereby been much limited. We are enabled to understand now better the gradually increasing number of instances in which the Wassermann reaction is positive in non-syphilitics and the lack of the reaction at times in syphilitics.

As a result of long continued observations carefully carried on by Dr. Bruère in these laboratories and by other observers, it may be laid down as a general proposition that any agent which either increases or diminishes the lipoid protein contents of the blood interferes with the reaction so that the results are unreliable as a test for syphilis. Under such conditions positive or negative reactions may occur. Thus, during digestion (particularly after fatty meals), acidosis, lipæmia, and after chloroform or ether narcosis, the blood may give a strong Wassermann reaction in non-syphilitics, that is, lipoids are dissolved and thrown into the blood. On the other hand it appears that the reaction after long chloroform or ether anæsthesia may become negative in syphilitics, possibly, because much lipoid has been dissolved out of the blood. Thus, the blood may also be negative and the cerebro-spinal fluid positive. The same applies to infectious diseases, especially where, as in pneumonia, rapid resorption of large amounts of inflammatory exudate occurs or in ulcerating tumours. Here also the blood becomes rich in euglobulin which is one of the components of the amboceptor in syphilitic blood.

This very practical lesson must, therefore, be drawn, that, in order to obtain a reliable test for syphilis with the Wassermann reaction it is necessary to use the following precautions: First: Blood must be taken directly from vessels, avoiding the skin, (subcutaneous fat), and not by blister or cupping. Second: Blood should never be taken (a) after a meal (but while fasting), (b) during a fever, (c) during any acute infectious disease, (d) during suppurations or resorptions of large inflammatory exudates (pneumonia, empyema, etc.), or even in ulcerating or necrosing tumours, (e) after narcosis. As a second proposition, it may be put down that a negative Wassermann does not necessarily exclude syphilis.

I do not want to be understood as discrediting or underestimating the value of the Wassermann reaction in the diagnosis of syphilis. But our experiences, together with those of others, emphasize the necessity of proper precautions in obtaining the material (blood) for, and the relativity of, the reaction. Here, then, theoretical considerations as well as practical results meet and combined give us an intelligent understanding and a reliable application of a complicated immunity reaction.

The principles underlying the Wassermann reaction have possibly a much wider and general application to immunity. For instance, if a given quantity of diphtheria antitoxine is added to the toxine in fractions, neutralization of more toxine occurs

than when all is added at the same time.⁷ This is also true of ricine, the toxic principle of the castor bean, and antiricine; if ricine is added in separate amounts to antiricine, more antiricine is necessary for neutralization than when all ricine is added at once. It has also been shown in the frog that adsorption of tetanus toxine by the nerve trunks occurs at low temperature, but poisonous effects do not occur until the animal is heated to 20° C.⁹ Even the chemical specificity of the amboceptor or anti-body in other immunity reactions is not quite certain; it may represent only an increased production of substances normally present in tissues and fluids which under certain conditions and influences form large colloidal complexes, and by selective adsorptions pose as specific chemical compounds and reactions.

From what has been presented, it appears that the phenomena of immunity are, partly, of complicated colloidal character, largely of the nature of adsorption, partly, adsorption plus chemical union of at present quite unknown substances. We must remain conscious of these facts in applying immunity reactions to the practice of medicine.

Let us now turn to another phase of immunity which at first sight appears far removed from the Wassermann reaction, but which careful reflection shows very closely related to it. I refer to chemiotaxis and phagocytosis. Movement and ingestion of foreign particles such as food, bacteria, pigment, are fundamental characteristics of life and possessed by all free cells. Both were once regarded as specific of living forms, and in a way, intelligent expressions of life and useful efforts of protection. To-day we know that these functions are by no means confined to living matter, that both properties follow essentially the laws of surface tension in cells as in non-living substances suspended in fluid. When a drop of a fluid is suspended in another, the particles of each fluid are, as is well known, under a considerable cohesion force which holds them together. Within the drop suspended in the fluid the force is equalized by each particle being subjected to the same pressure or force from all sides. But the particles on the surface of the drop are exposed to unequal pressure, for that of the outside fluid is different from that of the drop, so that the surface particles are exposed to the pressure of the two fluids, and this is surface tension. The surface tension endeavours to reduce the free surface to a minimum and this is perfectly represented by the sphere.

But the cohesion affinity and power varies in fluids so that

some have high, some low surface tension. Again, if substances are dissolved in another the resultant surface tension equals that of the two substances.

If, then, on a point of the surface of a drop suspended in another fluid, the tension is lowered, remaining stationary elsewhere, the drop will bulge and flow in that direction. If, on the other hand, the surface tension is increased at a given point, the wall of the drop will be indented, and the whole drop will flow away from this increased tension towards less resistant parts. Thus we have movements closely simulating positive and negative chemiotaxis. If, for example, we take a drop of metallic mercury and suspend it in a flat Petri dish in a 10 per cent. solution of HNO_3 , the drop will assume the shape of a sphere. Suppose we now put a crystal of potassium bichromate in the solution close to the mercury. As the crystal dissolves and strikes a point on the surface of the drop of mercury this is oxidized, the surface tension thereby lowered and the drop projects in this direction, sends out pseudopodia and ultimately moves towards the crystal, around which it will execute the most active and bizarre motions, apparently battling with it until the surface tension has again been equalized by the solvent action of the acid on the oxide, then the mercury assumes once more the quiescent form of a sphere.

This is, of course, a very simple and, in a way, crude experiment, but we owe to Ludwig Rhumbler most interesting and elaborate observations which show that chemiotaxis as well as phagocytosis are fundamentally surface tension phenomena.¹⁰ An amoeba, leucocyte or other cell are, physically considered, a drop of a colloidal suspension surrounded by a delicate surface layer which is more or less readily permeable to solvents and substances in solution. In any fluid this colloid drop is suspended in a liquid of different composition. These conditions may be imitated in a simpler fashion by suspending a drop of clover oil or chloroform in glycerol and weak alcohol with which it will gradually mix. Such a drop will move about, send out pseudopodia and change its form as an amoeba does. If some strong alcohol is added near the drop, the surface tension on this side will be lowered and the drop will flow in that direction (chemiotaxis). It will also flow towards a heated point, because heat lowers surface tension. But further, even the ingestion and choice of food may be artificially produced. A drop of chloroform in water or weak alcohol, will refuse certain substances, as glass or wood, and, if introduced, will expel (vomit) them; but if a

piece or thread of shellac, vulcan or paraffin be brought into contact with it, the drop will, in amœba fashion, flow around it. Even more, if a thread which an amœba ingests is too long, it stretches along the thread and by bending it, crowds the thread into a coil within its body. This looks like a voluntary or instinctive action, but Rhumbler showed that when a long thread of shellac is offered to a drop of chloroform, it proceeds to bend the thread in the middle, sends out pseudopodia along the thread to pull it in, coils it up inside and then digests it. A thread six times as long as the drop of chloroform may thus be taken in.* Moreover, if a piece of glass rod is covered by shellac and then introduced into the chloroform drop, the shellac is retained, but the glass rod expelled. Even the formation of shells by certain protozoa (diffugia) has been imitated by Rhumbler by mixing oil with quartz grains and 70 per cent. alcohol. The grains are thrown out to the surface of the oil drops and adhere to one another as they do in diffugia, and these artificial shells remain intact for months. While the amœba and other cells are certainly much more complicated in their make up and, therefore, in their physical relations to the outside, these experiments strongly suggest that, at least, many of the elementary motions and actions of cells are exhibitions of changes in surface tension. This is also borne out by the observations on the behaviour of higher tissue cells towards certain reagents. Thus, B. Fischer, found that the injection of sudan or scarlet red in oil, into the ear of rabbits caused dissociation of the surface epithelium, and growth and migration towards the sudan. The same influence has been found after the application of coal-tar, ether and, generally speaking, lipoid solvents, as also in artificial parthenogenesis by J. Loeb.¹¹ The term chemiotaxis is, therefore, strictly not correct, for the attraction of cells does not depend upon chemical affinity, as once believed, but upon physical changes in the environment of cells. It is probable that the emigration of leucocytes in inflammatory exudation depends upon the same phenomena, for the products of cell disintegration and inflammatory irritants lower surface tension in the tissue fluids. When these diffuse into the blood they will necessarily attract leucocytes in the direction of the greatest lowering of the tension. They pass then through stomata of vessels and move in the tissue fluids until the tension is once more equalized. The changes in size and shape of inflammatory cells after exudation,

*These experiments are regularly demonstrated in my lectures on general pathology before the class.

their polymorphous character and the fusion of cells to giant cells are also largely governed by the physical factors of their environment. If we take small particles of camphor and throw them into water, they exhibit very active motion. If we now cover the surface of the water by a thin film of oil and thus equalize surface tension, the camphor particles come together, agglutinate and form large irregular masses, as occurs in cell agglutination and cell fusion.* We may, therefore, conclude that, as the Wassermann reaction depends upon phenomena of surface energy (adsorption) so chemiotaxis and phagocytosis depend fundamentally upon the phenonema of variations in surface tension. It is clear, therefore, that what was called opsonins and opsonic variations are essentially not chemical, but physical phenomena.

Now, finally, a few more words bearing on natural immunity. At the beginning it was stated that the third phase of immunity in a way the goal of immunity, is the creation of conditions which are unfavourable to settlement and growth of infecting agents by modifying the physical and chemical constitution of tissues. We have known for a long time that individuals may carry after an infection, or even never having undergone any infection, virulent bacteria, and these individuals, so important from the epidemiological standpoint, are spoken as of "carriers".

Instructive in this regard is especially gonorrhœa. For we know that the gradual adaptation of the gonococcus to the urethral mucus membrane is not due to any antibactericidal action of the tissues, but that the gonococcus continues fully virulent and that, therefore, the inflammation excited by this irritant does not, in this instance, heal by decreasing the virulence of the invading agent.

We also know that venous congestion, although in other respects rather detrimental to cell life by asphyxia and increased H. ionization of the tissues, is unfavourable to settlement and growth of bacteria. Bier's famous treatment of tuberculosis depends on this observation.

How can these perplexing questions be explained? It would seem that here also complex physico-chemical conditions of the tissues are involved which make an attack, or better expressed, a union of bacteria to cells impossible.

For it appears, from recent observations with which Dr. Gross

*An ingenious experiment of this kind for class demonstration by the epidiascope has been designed by my colleague, Professor Francis Lloyd of McGill University.

and I are now engaged in my laboratories, that the colloidal state of cells and their physical environment are here of great importance.

We have deviated in our studies of natural immunity from the general custom of employing complex animals, but have chosen the simplest kind of protozoal organism, the paramæcium, for our studies. This we have been, and are still growing under varying physical influences with pathogenic bacteria. We have thus observed that the ability of pathogenic bacteria to attack and destroy paramæcia depends to a considerable extent upon physical factors, such as salt contents of the media, that, for example, in higher salt concentrations paramæcia are more vulnerable than in lower or saltless media (swelling and hydrops of cells). These studies, which are not yet finished and which will appear in detail elsewhere, may give us a clue to the therapeutic effect of venous blood congestion and to natural immunity.

One of the difficulties in studying immunity has been that observations have been made almost exclusively amongst the highest and most complex animals in which it is extremely difficult to control the various steps and possibilities in an experiment. It is hoped that the study of simpler organisms will in the future clear up at least some of the many questions and problems still to be solved.

References:

1. A more extensive discussion of these elementary matters may be found in HIS and ZINSSER; "Text book of bacteriology." D. Appleton Co., 1914, p. 118, FF.
MACFARLAND—"Pathogenic bacteria and protozoa." W. B. Saunders Co., 1915, pp. 66, 88, 270, and 279.
ZINSSER—"Infection and resistance," etc. The MacMillan Co., 1914.
MUIR AND RITCHIE—"Manual of Bacteriology." The MacMillan Co., 1913. p. 549, FF.
2. WALKER—"On the colloidal nature of the Wassermann reaction," *Journal of Pathology and Bacteriology*, xxi, April, 1917, p. 184.
3. MUIR—"Studies in immunity," 1910, p. 90.
4. BROWNING and MACKENZIE—"Recent methods in diagnosis and treatment of syphilis," 1912, p. 68.
5. NOGUCHI—*Proc. Soc. of Exp. Biol. and Med.*, vi, March 19th, 1909.
6. WALKER—I.C.
7. BAYLISS—"Principles of general physiology." Longmans Green Co., 1915, p. 51. Here the relation of physical factors to phenomena of life is thoroughly presented.
8. DANTSZ—*Mélanger des toxines avec leur antitoxines*, *Ann Just. Pasteur*—1902, xvi, 331-345.
9. MORGENROTH—*Tetanus des Frosches*. *Arch f. internal Pharamakodynamik*. 1900, vii, 265-282.

10. RHUMBLER—(a) *Physikalische Analyse von Lebenserscheinungen der Zelle* Archiv. f. Entwicklungsmechanik. 1898 vii, 103-35. (b) *Zur Theorie der Oberflächen-Kräfte der Amöben.* Zeitschrift f. Wissenschaftl. Zoologie, 1905, 83, 1-52. (c) *Nahrungsaufnahme bei Amöben etc.,* Arch. f. Entwicklungsmech. 1910, 30, 194-223. (d) *Das Protoplasma als physik. System.* Ergeb. d. Physiol, 1914, xiv, 484-617. See also BATLISS; l. p. 3 ff; and Gideon Wells, "Chemical Pathology." W. B. Saunders Co., 1914, p. 230-251.

11. This whole matter is well reviewed by BORST; *Das pathologische Wachsthum; "Pathologische Anatomie"* by L. Aschoff, 1911, i., p. 555, ff.

(In regard to coal tar it has recently been claimed by Yamagiwa and Ichikawa that its repeated application causes typical cancerous growth. *Journal of Cancer Research*, iii., 1. 1.)

MR. JAMES MANUEL, who died at Ottawa on February 20th, was the founder of the Ottawa Anti-tuberculosis Association and a vice-president of the Canadian Association for the Prevention of Tuberculosis. Mr. Manual was greatly interested in hospitals and charitable work and it was largely due to his efforts that the Royal Ottawa Sanatorium was established. As treasurer of the County of Carleton General Hospital, Mr. Manual proved himself invaluable and it was due to his wise counsel and frequent aid that this institution was placed upon a sound financial basis. He was also a generous benefactor to the St. Luke's Hospital and the Young Men's Christian Association.

NOTES FROM A CANADIAN HOSPITAL IN THE NEAR EAST

LIEUTENANT-COLONEL E. J. WILLIAMS, D.S.O.

Commanding No. 1 Canadian Stationary Hospital

THE nature of the work in a military hospital depends in a great measure upon its military and geographical location. Certain factors, such as a proximity to the fighting line, the number of hospitals allotted to a Division or Army, climatic conditions, health of personnel, ease or difficulty of transportation, water supply, etc., determine the "fate" of a hospital unit to a great extent.

In the near East many difficult problems have been faced which have taxed the resources of those in charge of the Medical Service to the utmost; a few of these I will enumerate.

Climatic conditions and sickness in personnel of units. It is a recognized fact that a large percentage of individuals arriving in the East from England or the northern parts of Europe, develop within a period of two or three weeks an illness which in this area is popularly termed "*Mal-de-Salonique*". In the summer months this takes the form of acute diarrhoea, sometimes a dysentery of a severe nature lasting for weeks. One of the predisposing factors is thought to be a chilling of the body surface, especially of the abdominal wall, during the cool evenings following the hot days, hence the use of body or cholera belt to prevent its development. After one has lived in the country a few months he learns the value of this protection in the hot weather.

In the fall and winter it manifests itself in the form of an indefinite fever with malaise, loss of appetite, headache, and pains in the muscles and joints. The condition is often diagnosed as P.U.O. (pyrexia of unknown origin). In many cases the condition becomes quite severe and may incapacitate a man for weeks.

Under these circumstances the work of a new unit is often particularly hard on account of the large number of casualties in the personnel.

The two common tropical diseases, malaria and dysentery,

are also serious factors in the matter of reduction in the strength of the personnel of a unit, when these diseases make their appearance.

The difficulty of eradicating these diseases from the system under the existing conditions is great, with a consequence that a great percentage of the personnel may be affected with one or both at the same time. Recurrences are common, periodically rendering the individual unfit for duty. Both of these diseases manifest themselves in a much different manner from the classical form described in text-books and commonly seen in India and other tropical countries. The consensus of opinion among medical officers in this area, who have had extensive experiences in tropical medicine, is that the types of diseases here are of a more severe nature than elsewhere.

Heat stroke and heat exhaustion are not uncommon in mid-summer but the period of extreme heat is not long, so that the number of cases developing in a year is comparatively small.

During the summer months of 1916 (April to October), the mean temperature was below 78°. June has the highest average it being about 90°, while the hottest day in 1916 in this section was 110°.

The heat is not oppressive so that one may feel fairly comfortable on a day with the thermometer registering 90°, as there is generally a fresh breeze blowing, and the humidity is not great.

With regard to the class of cases admitted to a military hospital here, a large percentage are medical, the proportion being twelve medical to one surgical during a period of twenty-two months, malaria and dysentery contributing more largely to the list than all others combined.

As previously mentioned, the clinical course of these diseases especially malaria, is most atypical, which condition is probably due to the "host" and environment, and not the infecting organism.

The number of cases of dysentery admitted at this base is small, compared to our experience on Lemnos Island, where the medical personnel were afforded an exceptional opportunity for studying both types (amoebic and bacillary) of the disease. A very few cases of so-called trench fever and trench nephritis have been treated, while of the commoner diseases met with in everyday life, these have been a very small proportion.

In the surgical section, although the work has not been extensive, many interesting head, chest, and abdominal cases have been treated.

The co-existence of malaria with a surgical condition handicaps the surgeon, both in the matter of wound treatment and diagnosis. A clean appendix case may go along nicely for some days following operation and suddenly the temperature may rise to 103° or 105° —no chill, just a slight feeling of malaise.

The surgeon naturally becomes anxious, but soon his fears are allayed by the report from the bacteriologist who has demonstrated plasmodium malariae in the blood smear, or the clinical manifestations are quite apparent.

In many cases, the presence of malaria infection in a patient recently operated upon, leads to a cessation of the healing process in a clean wound with the consequence that when the supporting stitches are removed it opens from end to end. This extremely annoying complication generally entails a great deal of attention on the part of the surgeon on account of the prolonged wound treatment, as also that of the complicating condition—malaria. As a rule these cases eventually do very well.

The food supply has been uniformly good in quality and quantity and can be readily supplemented by native grown products such as vegetables and fruits. Besides this a great many units have planted their own mess gardens. These are now (July, 1917) yielding potatoes, tomatoes, beans, peas, etc. In some instances there are divisional farms.

Transportation. In a country practically devoid of railways, possessing very poor highways sparsely spread over thousands of square miles of rough mountainous areas, the difficulty of transportation can easily be imagined.

In one section alone, with a line of communication of over fifty miles, there is no railway and only one highway over which all troops, supplies, sick and wounded, must be transported; so the difficulties which present from day to day seem at times almost insurmountable. The labour required to maintain the road in a passable state is stupendous, and were it not that the weather conditions are so favourable for the greater part of the year, the task would be next to impossible. During the earlier part of the eastern campaign the transportation of the sick and wounded was a serious problem, especially from the point of view of the patient, with the consequence that much of the work commonly done in the stationary and base hospitals was carried out in field ambulances, casualty clearing stations, and stationery hospitals.

The latter in some instances were placed along side clearing stations nearer the front line, well advanced along the line of com-

munication. Large convalescent depots also have been established in connexion with different divisions at short distances from the front line for the treatment of the milder cases, thus reducing the strain on transportation besides saving the patient from ill effects of a long journey over the rough roads to the base. This latter has been a very potent factor militating against the patient's health.

Over a portion of this line, railways are now being built which will add much to the ease of transportation of the sick and wounded.

Disposal of patients from hospital. The man evacuated from hospital as permanently unfit is "marked out" for Engand. One who will not be fit for duty within six or eight weeks was, until recently, sent to Malta, but is now retained at this base.

If one studies the map, a difficulty peculiar to the East presents itself in the long distance between Salonica and these other two points, also in both instances it is sea travel.

The recent increase in the number of hospitals at this base, also the additional accommodation added to those already here, has effectually solved the difficulty which resulted from the reduced service of hospital ships owing to the submarine campaign. Large convalescent camps have been established, and others are in the course of construction. The location of these is most favourable, being elevated plateaus overlooking the sea, practically free from mosquitoes and from ten to twenty degrees cooler than the city of Salonica and immediately surrounding parts, whilst others were established on a large peninsula jutting out into the sea where the bracing sea breezes and salt water bathing do much towards hastening the convalescence of the sick soldiers.

This change in arrangements will no doubt add much to preserving the efficiency of the troops. Although there are serious difficulties to contend with, there are, on the other hand, many favourable features about Macedonia. The weather during the greater part of the year leaves little to be desired. During the months of June, July, August, the temperature frequently ranges from 90° to 106° but the average is much lower than this, being about 80°.

The nights are never excessively warm even during the hottest periods, but as a rule pleasantly cool and there is a more or less constant breeze from the sea or the Balkan mountains on the north.

The health of the troops, barring malaria and dysentery, has been exceptionally good. The elevated plateaus along the sea and inland are particularly well suited for hospitals and convalescent depots.

The water supply for the army was a question which, during the early days of the occupation of Salonica by the Allied force, caused not a little worry; not with regard to those in and about Salonica, where there is an abundant supply from the ancient aqueduct, but the troops encamped on the plains and mountains farther north.

However, no particular difficulty has been experienced, as springs in the different parts of the cuntry have proven more constant than was at first anticipated.

The question of drainage of the great plains in the minds of engineers here, does not seem to present very great difficulties, so that ere long we may see this portion of Macedonia one of the healthiest and wealthiest agricultural countries in the world.

In the matter of diversions and amusements, many concert troops have sprung up during the past year. These go from unit to unit (especially hospital units) giving concerts of varied types to the entertainment of the soldiers. The talent which is "discovered" at times is quite surprising and pleasing. Many London artists are serving in the Salonica forces, hence one may find four or five in a single company, in which case one may be sure of seeing and hearing a really first class production. Altogether, life in the East is most interesting, the customs and habits of the people, the ancient synagogues, churches, and mosques, the cosmopolitan population of Salonica where one may see in the course of an hour's walk through the streets the Greek, Bulgar, Serbs, Spanish, Jew, Roumanian and more rarely the Austrian and German.

Adding to this the military population, we have the British, Canadian, Australian, French, Russian, Italian, Serb, Montenegrin, Algerian, Sinegalese, Amanite, etc., etc.

With all these interesting factors which surround one here, it might be surmised that one would have enough to engage his attention for years to come. However, after two years' sojourn fighting malaria and dysentery one feels quite satisfied to say good-bye to these fascinating surroundings and turn one's face towards home, leaving the Easterner to enjoy his habits and customs of life to himself.

AN EXPERIENCE THROUGH THE HALIFAX DISASTER

By CAPTAIN FREDERICK T. TOOKE, C.A.M.C.

Montreal

THE recent catastrophe at Halifax has apparently come and gone. Passed, perhaps to many at a distance whose near point is always fixed in relation to their preoccupation with the affairs of the moment and within their own very limited range of vision; an event never to be forgotten in life's experience on the part of those whose fortune drew them to the help of that unhappy city.

Call the event an accident, a blunder, the part of an organized plan, define it as you will, it must still remain a tragedy of the war and be particularly considered as such as any event that has happened in France or in Flanders. Far be it from me to dare to assume the rôle of an armchair critic at such a distance regarding what is happening overseas. I have, however, seen Halifax and I do happen to know what has happened there. A well-known officer of one of Canada's most brilliant battalions enjoying the distinction of a Master of Arts degree as well as a Distinguished Service Order decoration with bar, a scholar no less than a soldier, told me on driving me home to my billets one night after work, "the war has nothing on this, and I have seen the worst of it."

Be it an act of war in our own country, or approach it from any angle that may suit your own personal idea or opinion, however ridiculous or however improbable, I wish to state at the outset that I am glad that I was there. More than that, I would acknowledge with deep gratitude the privilege and the unusual opportunity accorded me, probably that of a lifetime, of helping suffering humanity; an occasion which might equally well have fallen to another and a duty that might have been fulfilled by another with more brilliant results if not by greater zeal and honesty of purpose.

The occasion could not have been staged with greater tragedy: the horror of its results could not possibly have appealed to anything other than what we are pleased to term our better selves. The whole affair was in many respects a revelation with respect to our regard for human nature.

A record of the events of any human experience, however satisfactory or however satisfying, is seldom published without being weighed down by an if or a but. Our recent adventure is no exception to such a general rule. My only regret is that our call for help from Halifax had not been made more immediate and that we could not have arrived on the scene twelve or eighteen hours earlier. It would appear that the delay was unavoidable for obvious reasons.

On December 8th, I was ordered by Lieutenant-Colonel Patch, A.D.M.S., Military District No. 4, to proceed at once to Halifax and report for duty to Lieutenant-Colonel F. McKelvey Bell, A.D.M.S., Military District No. 6. My only instructions were that with the recent explosion an unusual number of eye casualties had occurred and that an eye surgeon was urgently needed. I left by the first train available, taking a complete set of eye instruments. Through the courtesy and thoughtfulness of the authorities of the Royal Victoria Hospital who had heard of the order, Miss Etter of the nursing staff of the Ross Pavilion was detailed to accompany me for special duty. The trip to Halifax was uneventful but for its discomfort. We started out in a blizzard; much delay was experienced the first night driving against snow drifts. The following morning when connecting with the commissariat department at about ten o'clock, five hours late, we were put on very much reduced rations. Only two rather meagre meals were served by the dining car. Later on as the day grew dark, the electric light installation went out of order, a dim and almost inconspicuous light flaring up brightly only every few revolutions of the wheels. As we were dependent upon two candles during the intervening space of time the effect on the eyes was the same as frequently testing pupillary reaction, and the result was headache. Our delay of six hours was in many ways an unmixed blessing for we were able to get a second rather comfortable night on the train rather than undergo the anticipated difficulty of looking up billets in the early hours of the morning in a strange and devastated city.

We arrived at our destination on Monday morning at half past six o'clock. The day was dark and cold and the details of the city could scarcely be made out. The roof of the Canadian Government Railway Station had fallen in, innumerable cars and trucks were wrecked on the sidings, and we were compelled to make our way through a sea of broken glass and over countless obstacles, chiefly wreckage and coffins. One could not begin to count the latter. The sense of depression was almost unbearable. Not a sound could be heard, railway trains were not running, ours had only been the second

to arrive in Halifax, electric cars had been suspended, one could not even hear a motor horn. The streets seemed to be empty. The silence was intolerable and Halifax at first impression seemed to be in fact a city of the dead. We reported to Military Headquarters when I was assigned for duty of Camp Hill Military Hospital, taking Miss Etter with me.

A word of digression, however, regarding the source of the accident, its nature, and some of its effects. Probably a great deal of what I relate to you has already been furnished by the public press. Much detail might be supplied by many regarding the problematical nature of the explosion which I discreetly feel it better to avoid. In brief, the ammunition ship *Mont Blanc*, laden with tri-nitro-toluol in the hold and with benzol in tanks on the deck, was rammed by the Belgium relief steamer *Imo*. With the collision the benzol ignited, and the *Mont Blanc* was soon ablaze. A call was rung in for the Halifax Fire Department. The peculiar glare from the light as well as the ringing of the fire alarms attracted everybody to the windows, principally women and children. An attempt was made to scuttle the burning ship, but without avail. In less than half an hour's time a terrific explosion occurred as the result of the benzol and the tri-nitro-toluol coming together. One must visit Halifax and view its ghastly scars in order to estimate its awful result. Imagine an area bounded by Pine Avenue on the north, Dorchester Street on the south, Cote des Neiges Hill to the west, and St. Lawrence Main Street on the east. An area one and a half miles square was laid flat, not a dwelling was left intact, large trees were shattered. There was not one building in the whole of Halifax without broken glass. The home of the late Lieutenant-Governor McKeen, where I had the good fortune to be billeted, three and a half miles from the source of the accident, had more broken glass than one could count. A fortunate circumstance in many cases as in this was that the double windows had not been put up for the winter.

A few curious freaks showing the frightful force of the explosion. The anchor of the *Mont Blanc* weighing six tons was discovered in one of the dismantled Exhibition buildings three miles away. The ship's 4.3 gun was found a mile away over on the Dartmouth side. Many bodies were found with their clothing literally torn off them without their necessarily having been burned, while one man was carried through the air for a distance of a quarter of a mile, and landed on terra firma, his only misfortune apparently being that a keg of nails had been predestined for his point of alighting.

Verily the days of Münchhausen are still with us. This statement, however, I can vouch for, as the man gave evidence before the Naval Court of Enquiry the day before I left Halifax. But to return to my special mission and my own experiences.

I reported to Major Morris, officer commanding Camp Hill Hospital, the largest unit in action during the emergency. Camp Hill is a hospital designed, equipped, and intended in Halifax as others are contemplated in other Divisions, for returned men who have been invalided home. The estimated capacity of Camp Hill was two hundred and eighty beds, plus the sun parlors. By a fortunate coincidence there was a complete complement of medical officers, staff, and orderlies. Captain John Fraser, A.M.C., was also in Halifax with two hundred reinforcements for the Army Medical Corps waiting for transportation overseas. Owing to Camp Hill hardly having been in action there were only five nursing sisters on duty, two for relief work and one for night duty. When the crash came Camp Hill accommodated 1,630 patients. Let it be said to the everlasting credit of the V.A.D.'s that they nobly filled the breach. Also to that of Colonel McKelvey Bell, A.D.M.S., Military District No. 6, for the perfection and thoroughness of his organization. It was wonderful how quickly it was brought into action for such a crisis and how thoroughly and with what detail the work was carried on. I never saw a large body of men and women work so harmoniously together. Besides the regular workers associated with the Army Medical Corps, there were all sorts of helpers enlisted from all classes of society, making beds, scrubbing the wards, carrying food, feeding the helpless, caring for the children, washing dishes and helping in a hundred and one different ways; mistress rubbed shoulder with maid and char-woman, all imbued with the same desire to help. All the motors were commandeered and women frequently served as transport officers. Although at the dawn of a Christmas season one could shudder with the thought of "Peace on Earth", one was inspired and encouraged with the doctrine of "Good-will towards Men".

Many of the wounded died the day they were admitted to hospital and for this reason, after the explosion it was quite impossible to prevent terror and panic on the part of the mob, and the rumour spread that the fire was making headway towards the arsenal at Wellington Barracks. A still more serious explosion was anticipated and the poor people fled to the parks, woods, and open places, away from the centre of the city, scantily clad with their ghastly wounds unattended. Here they were overtaken by a terrible

blizzard and rescued by stretcher bearers in a half frozen and almost exsanguinated condition. The mortality was in consequence at first terribly high, largely the result of exposure, exhaustion, and loss of blood, a circumstance for which nobody could be held directly responsible.

Every available bit of space at Camp Hill was taken up. Men, women, and children were first all collected in the same ward irrespective of their condition. Frequently three would occupy the same bed. Patients were even under the beds and between the beds lying on blankets as well as in the corridors. One made one's way through the wards with the greatest difficulty. The day of my arrival the numbers were reduced to nine hundred, and I would pay this tribute to Major Morris by saying that the hospital was carrying on in excellent order. The windows had all been repaired, each patient had a bed or mattress with warm clothing while an abundance of good nourishing food was served alike to patients and staff.

I was taken to a small back room lighted by a single electric globe. Here a man was operating who was introduced to me as Dr. Cox of New Glasgow. I pay my tribute to this small town specialist as well as to Dr. Putnam of Yarmouth, who later came to my assistance. The first mentioned bore the brunt of the first shock of the service. He left his work at home at a moment's notice and travelled one hundred miles to Halifax. He was left four miles out of the city groping about in the dark, frequently stumbling over dead bodies before he was able to reach the centre of the city. He at once put in a twenty-four hour continuous service and after a three hour rest had started again when I discovered him. Most of the night he had been working in the kitchen and operating on the floor. Dr. Cox from his appearance might have been anywhere from forty to sixty-five years of age, such was the result of fatigue in his expression and behaviour. He was manifestly exhausted and he told me that he had done so much work that his instruments would no longer cut. I sent him off to bed and proceeded to take over the service and sort out the material. There were about one hundred and twenty people in the one ward, practically all major operation cases. For this service I had two other oculists associated with me beside Dr. Cox to whom I have already referred. Dr. Cox left for his home the day after my arrival, one member of the staff developed a severe gastric disturbance due to overwork, while the third acquired a paronychia.

Left practically alone I consequently proceeded to form a

"Union Government". Dr. Ames, a general practitioner of Westville, Me., acted as surgical dresser, Mr. Haslam, a fifth year medical student, gave more chloroform and gave it better than I have ever seen it given before. Sergeant Wallace, a returned Army Service Corps man whose like I have yet to find for honesty, energy, and ability, acted as my orderly, while Miss Etter and I completed the team. From this time on operations were undertaken somewhat more cautiously, due to the fact that the most urgent had already been performed.

Let us make a very brief survey of some of the cases in one ward under my care. Anything like complete note-taking was quite out of the question. We were working under such pressure that it was impossible to dilate on a few very sketchy notes without feeling that the more important fact of treating the patients was being overlooked. Sergeant Wallace who was always at my heel with pad and pencil managed to collect these few facts from me which afford one a fair average of the hundreds of such cases in the hospitals of Halifax.

1. W. A. G. Right eye uninjured. Left eye, two long perforated wounds of the cornea, iris prolapsed. Iridectomy and edges of iris freed.

2. Unknown child. Wound of lid with marked induration of tissues. Examination under chloroform, eye uninjured.

3. Mrs. M. A. Both eyes and appurtenances torn to shreds. Remains enucleated, double dressing to orbits, multiple glass wounds of face and neck.

4. M. C. Child about three years. Laceration of left upper lid. Left eye completely destroyed. Lid sutured and remains of eye enucleated.

5. G. A. M. Laceration of lids of right eye, globe normal. Left eye perforated wounds of cornea. Iridectomy and lids sutured. Glass wounds in neck.

6. J. K. Left eye completely collapsed, enucleated. Right eye perforated wounds of the cornea, prolapsed iris, iridectomy.

7. Mrs. R. B. Multiple wounds of left cornea below at temporal side near ciliary margin. Presenting iris excised and flap of conjunctiva sutured over wound.

8. R. F. Multiple glass wounds of both lids. Dressed.

9. J. C. Abrasions of both corneæ. Dressed.

10. J. B. Complete destruction of both eyeballs, large fragments of glass removed from globes after enucleation.

11. Mrs. G. R. Multiple incisions of both lids. Dressed.

12. G. B. Right eye normal. Perforated wound of left sclera up and out. Sutured conjunctiva over wound and applied double dressing for a few days.

13. R. S. Right eye normal. Perforated wound of left cornea. Iridectomy, argyrol, atropine and bandage.

14. G. H. Slight abrasions of right cornea. Condition not serious.

15. A. L. Right eye normal, left eye collapsed, enucleated remains.

16. Mrs. T. A. E. Superficial abrasions of right cornea. Perforated wound of left sclera with prolapse of ciliary body. Excised prolapse and sutured conjunctiva over wound. Atropine, argyrol and double bandage. To be treated conservatively pro tem.

17. Mrs. D. McK. Left eye abrasions of cornea. Perforated wound of right cornea with prolapse of iris. Iridectomy, atropine, argyrol and bandage.

18. F. McK. Left eye normal, perforated wound of right cornea, prolapse of iris. Iridectomy, atropine, argyrol and bandage.

19. Mrs. A. D. Left eye normal. Long perforating wound of cornea extending into sclera and ciliary body. Two other perforating wounds of sclera. Eye enucleated.

20. E. B. Right eye normal. Multiple wounds of cornea. Anterior chamber completely filled with blood. Treat conservatively for a few days.

21. W. H. Left eye normal. Perforating wound of right cornea with prolapse of iris. Iridectomy, atropine and bandage.

22. Mrs. G. A. M. Left eye normal. Right eye completely destroyed. Enucleated remains of right eye and sutured lids.

23. Mrs. A. B. Right eye normal. Half inch perforation of left sclera from corneal margin backward, globe collapsed, enucleated.

24. Mrs. S. R. Right eye completely destroyed, enucleated, large corneal wound of left eye extending into ciliary body above. Conjunctival flap, atropine, argyrol and bandage.

25. A. S. Right eye normal. Extensive perforating wound of left cornea with prolapse of iris. Iridectomy, atropine, argyrol and bandage.

26. Mrs. C. S. Right eye normal, left eye completely destroyed, enucleated remains.

27. T. N. Left eye normal. Oblique wound of left sclera over ciliary body, ciliary body and vitreous presenting. Enucleated.

28. M. B. V shaped ragged wound of left cornea extending into the conjunctiva below. No apparent inclusion of iris or ciliary body. Atropine and bandage both eyes.

29. J. McM. Left eye normal. Perforating wound of the right cornea at nasal side, prolapse of iris. Iridectomy.

30. A. S. Right eye normal. Perforated wound of left cornea at limbus. Iris incarcerated. Iridectomy. Soft lens matter to be evacuated later. Double bandage.

31. F. S. Extensive necrotic wounds of lids and right side of face. Neither eye injured. Moist dressings to lids and face.

32. Mrs. P. Wound of right cornea extending 2 mm. inward to nasal side towards ciliary body. Iridectomy, atropine, and double bandage.

33. Mrs. H. McN. Wound of right cornea at limbus, iridectomy. Edges freed, atropine and bandage.

34. Mrs. S. R. Perforating wound of left cornea with prolapse of iris. Iridectomy. Right eye has already been enucleated.

35. F. B. Perforating wound of right cornea from limbus to centre of pupillary area. Iris incarcerated and fixed about pupil. Iris freed and iridectomy done.

36. Mrs. A. S. Ragged tear of right cornea above in vertical line. Inclusion of ciliary body and vitreous in wound. Treated conservatively. Perforated wound of left cornea below with presentation of iris covered by conjunctiva. Traumatic cataract. Atropine and double bandage.

37. Mrs. R. P. P. Small linear incision made over left lacrimal bone for escape of particle of glass. Moist dressing.

38. Mrs. M. V-shaped wound of cornea with deposit of lymph about edges. Hyphæma. Iris cannot be detected. Edges of wound freed, atropine and bandage.

39. M. D. Opening of conjunctiva over insertion of external rectus muscle for escape of glass particle.

40. L. D. Large perforating wound of right ciliary body above. Globe enucleated.

41. W. A. R. Right eye normal. Large corneo-scleral wound of left eye with prolapse of ciliary body. Enucleation of eyeball.

42. Mrs. W. Left eye completely destroyed. Extensive penetrating necrotic wound of lid. Oil silk inserted in orbit to prevent adhesions of lid to conjunctiva.

43. M. L. Perforated wound of right sclera at temporal side. Incarceration of ciliary body, excised. Perforated wound of left

cornea, prolapse of iris, wound granulating over, traumatic cataract. Atropine and double bandage.

44. Mrs. G. N. Right eye collapsed, panophthalmitis. Necrosis of tissues with œdema of lids. Enucleated, moist dressing.

45. Mrs. S. Both eyes so destroyed that organs cannot be distinguished. Extensive wounds of face and lids. Moist dressings.

46. A. P. Right eye normal. Perforating wound of left cornea 4 m.m. in length opening horizontally toward nasal side of corneo scleral margin. Iridectomy.

47. M. S. Right eye collapsed, enucleated. Left eye shows multiple incised wounds of cornea extending from centre of pupillary area to corneal limbus below. Wound gaping and vitreous presenting. Vitreous excised. Conjunctival flap and bandage.

48. B. C. Vertical incised wound of right cornea. Extends several mm. below the corneo-scleral margin. Wound has already been sutured and is apparently in a healthy condition. Cornea œdematous at temporal side. Atropine and bandage.

We had some exceedingly difficult enucleations where the lids had to be separated by retractors, so intense was the induration with the attendant necrosis of the conjunctiva. Secondary adhesions rendered our progress slow but in no case did we meet with any untoward complications while operating. In one or two cases I practised the Lister operation, separating the muscles and eviscerating the contents of the globe, at the same time excising most of the sclera and leaving only a small curtain of this tissue about the optic nerve. The idea of this procedure is presumably to offset infection backwards into the orbit. The reaction in these cases seemed to be much greater than in the simple enucleations where drainage forward, in my opinion, was better.

It must be remembered that the eye injury was frequently only an associated condition of the most ghastly incised wounds of the head, face and neck. These wounds were invariably caused by glass and could only be described as hideous, they were all too terrible. Much of our time was consequently taken up by attending to these wounds, the fact of dressing the eye being a mere coincidence. Practically every face wound was septic; nay more, each was welling out with a copious purulent discharge while other wounds appeared almost to be gangrenous. An earlier attempt had too often been made to bring the edges of these tears together by sutures, the stitches invariably sloughing out at one side, leaving the adjacent tissue more

necrotic. The faces appeared as though some filthy septic claw or rake had been dragged over the face as deeply as it could penetrate. In cases of retained glass a bloody serum kept being exuded rather than pus, this no doubt being due to the irritation caused by the restrained glass. In many cases it was marvellous how intense had been the injury inflicted upon one lid while the underlying eyeball had not been disturbed. On the other hand it was equally to be wondered at how often an eye was picked out by glass while the lid remained uninjured. I performed iridectomies, excised portions of presenting ciliary bodies in some desperate cases and attempted the repair of certain wounds of the cornea with fair success. In only one instance from my own series of cases did infection ensue. The exception was the case of a child who probably tried to remove her bandage. Any attempt at bacteriology would have been a burlesque. We made the best effort at asepsis that was possible under the circumstances. I could vouch for my instruments and dressings through Miss Etter's care. I could not employ rubber gloves as I abominate them in eye work. Perhaps there is a certain unrecorded virtue in the frequent application of "Queen's Laundry Bar" or some of the other commoner kitchen varieties of soap which seemed to come to my hand oftener than any other. Perhaps it was because I used strong bichloride till my hands began to cut, perhaps it was both; but more probably that because our luck was with us. A word for the conjunctival flap; we made use of it in numbers of cases both in scleral wounds as well as in incised wounds of the cornea and I do not hesitate to affirm that many of our successes were due to our assuming this precaution. Argyrol may have helped in certain cases while atropine was used along general lines as conditions warranted. When possible, all intraocular operations were left undisturbed for two days before I did the first dressing.

To show the wonderful reparative results achieved, I am able to state that Camp Hill Hospital was practically evacuated with the exception of about one hundred cases in ten days' time, the patients generally being transferred to civilian units or to homes organized for their care in some of the smaller neighbouring cities of the province, as Truro, Windsor, New Glasgow, Sydney. We had only twenty remaining in the eye ward, who were cases as a rule waiting for their homes to be reestablished in Halifax or who were expecting accommodation with relatives or with friends.

In Camp Hill Hospital 1,500 units of anti-tetanic serum was given to each patient but only on the fifth day after the accident,

as a large enough supply could not be obtained at first in the emergency. We did not have a single case of tetanus. One case, I believe, did develop at the Victoria General Hospital, but the condition subsided under treatment, the patient unfortunately dying from a lobar pneumonia. I did not see one case of spreading gangrene although the *B. aerogenes capsulatus* was noted in four cases in another hospital. We further did not have any cases of erysipelas, although I suspected it in one case, the condition shortly subsiding as a false alarm, such to my peace of mind. There was no meningitis at Camp Hill.

Various reports have been circulated regarding the number of those permanently blinded as the result of the accident. My opinion is that most of these reports have been exaggerated although the number is sufficiently appalling. I estimate that five hundred people, or one person in every one hundred and fifty of the population of Halifax will be or should eventually be wearing an artificial eye. Many will not be able to wear an eye for the reason that there has been irreparable damage done to the lids and face as well as to the orbit. About two hundred people will be blind if figures count for anything. I base my figures on the following estimate. The *Halifax Herald* makes the statement that only 3,000 people were injured. If 1,500 were cared for at Camp Hill and if eight other units were doing work to full capacity, this number could be easily doubled, especially if one is to include the number of people who were receiving private attention in their own homes or dressing stations. In my opinion 25 per cent. of the casualties were eye cases, making 1,500. Figures compiled from my own wards show permanent blindness in 10 per cent. of the cases which would mean one hundred and fifty of the total number. This figure will doubtless be augmented to two hundred when late manifestations appear in a single remaining injured eye. There are some questions and problems which will never be answered, or to which history must vouchsafe a reply in the course of time. Were too many eyes removed? I hope not. My time was completely taken up at Camp Hill where I had all that I could attend to. Eye work was done at every other unit or hospital for which I cannot possibly answer. My opinion from my knowledge of the men entrusted with the work is that it was conservatively and conscientiously undertaken and carried out. Most of the enucleating at Camp Hill had been performed by my predecessors, Dr. Cox and Dr. McLennan, although a few choice specimens—probably a dozen—complicated cases were left over for my particular edifi-

cation. From the eyes which I saw remaining and where an honest endeavour had been made at operative repair, I can safely say that no eye was removed at Camp Hill that was not irretrievably lost. One may equally well ask the converse, were any injured eyes left where the site of injury might threaten subsequent sympathetic trouble? Where the other eye was injured, no, where both corneae were incised with iris and ciliary bodies presenting, yes. Our hands were absolutely tied under such circumstances. One had no alternative but to trust to a kindly providence and to hope for the best. The problem which is now confronting the oculists of Halifax is the fate of an eye where a late sympathetic trouble may ensue to an inclusion of the ciliary body or to the retention of a glass particle in the uveal tract. There is material for a book on plastic operations on the lids and face. No author will ever find more material in so short a compass.

One or two observations in conclusion. I would like to testify to the generous and spontaneous response made by the American medical profession and by the American people in general. It was not a response, for in most cases no appeal for help had been made. The act of service was a spontaneous manifestation of a kindly sympathetic people to neighbours in distress. These were generous and appreciative in the broadest sense of the term. I might mention in particular, the Boston unit, the Maine unit, the Providence unit. Each one came prepared to undertake all forms of work on the shortest possible notice. Take the Providence doctors and nurses who left on two hours' notice. They were travelling on Sunday and wanted some Red Cross insignia. No shops could be found open at any of the stations through which they passed. They finally compromised with the porter of the sleeper for a discarded green curtain and an old sheet. The Providence unit will always be remembered with regard in Halifax as the Order of the Green Cross. On their arrival at Halifax every hospital had a complete staff. Providence started in to do a first aid in a systematic manner by visiting all homes about the devastated area where families had bravely attempted to hold together and tabulating such cases as well as attending to the wounded. When one of the hospitals was later evacuated Providence took possession with a full complement of patients ready at hand.

It is useless for me to attempt to acknowledge in proper terms the kindly consideration and hospitality of the people of Halifax, civilian as well as military. All were most keenly sensitive of whatever help we were doing our best to afford. All they had was ours

and their homes were our billets. My social experience was an extremely happy one and in spite of my hard work I actually enjoyed myself.

An outstanding feature, and one which impressed me greatly, was the absolute abstinence from indulgence in alcohol. One may be a fanatic regarding the question from both points of view, another may be uncharitable enough to say that whiskey may always be had and never easier than in a dry town. I did not detect alcohol in the case of a single patient, relative, soldier, or medical officer at a time when indulgence might almost have been condoned with as an only apparent solace in grief and depression.

One of the most remarkable statements which I am able to make is that throughout my service, in the presence of death, of suffering, and following the destruction of all that life and home held for them, I did not see one single tear shed while I was in Halifax. I naturally except the children, where a painful dressing was a sufficient excuse. Were the people as a whole stunned, or did higher ideals seem to be uppermost and the most generous and kindly motives to possess all classes and all natures? Everybody served and served gladly, from the highest to the lowest, and those with minor injuries were happiest when trying to help others with wounds more serious than their own.

And so I have come to the end of my story. As the recital of my surgical experience, necessarily sketchy through the emergency of the situation, it is probably of little value; as the tale of a professional adventure it is possibly of some interest; as the testimony of an endeavour to help a heroic and deserving people, it is no more my own than I feel it to be that of all who have taken the trouble to read of my sojourn in Halifax.

ANALYSIS OF CLINICAL TYPES OF PUERPERAL FEVER WITH SPECIAL REFERENCE TO PROGNOSIS AND TREATMENT

BY B. P. WATSON, M.D., F.R.C.S.E., F.A.C.S.

*Professor of Obstetrics and Gynæcology, University of Toronto;
Obstetrician and Gynæcologist, Toronto General Hospital*

AND

W. A. SCOTT, B.A., M.B.

*Assistant Demonstrator in Obstetrics and Gynæcology, Demonstrator
in Anatomy, University of Toronto; Junior Assistant in Ob-
stetrics and Gynæcology, Toronto General Hospital*

THE title of this paper will lead you to expect, we are afraid, something more elaborate than we shall be able to give in the time at our disposal. We propose in a later paper to give a detailed analysis of all cases of infection *post partum* and *post abortum* which have occurred in the obstetrical department of the Toronto General Hospital, and all cases already infected sent in to the gynæcological department from outside during the period from July 1st, 1914, to December 31st, 1916. To-day, however, it will only be possible to outline a few of our deductions and conclusions from that study.

We have taken as our standard of morbidity that laid down by the committee of the British Medical Association, viz., "All fatal cases and all cases in which the temperature exceeds 100° F. on any two of the bi-daily readings from the end of the first to the eighth day after delivery." During the period mentioned, the total deliveries in our wards were 2,096. Of these, 476 or 22.9 per cent. showed a morbidity according to the above standard. These include cases sent in obviously infected, cases of eclampsia, placenta prævia, induction of labour, and the various other operative cases which occur on an active obstetrical service. In addition it should be pointed out that in the Burnside Obstetrical Hospital there are two classes of cases: Those delivered and cared for by the staff, and

Read at the forty-eighth annual meeting of the Canadian Medical Association,
June 14th, 1917.

those treated by private practitioners of the city, any one of whom may have access to our semi-private wards. During the same period ninety-seven cases of gross puerperal infection were treated in our gynæcological wards, the patients having been delivered outside the hospital at varying intervals of time prior to admission. Taking then the patients confined in our own hospital, we find that out of the total four hundred and seventy-six showing a morbidity temperature, the following conditions were found:

There were sixteen cases of sloughing tears of the perineum, vagina, or cervix; nine cases of cellulitis; six cases of pus tubes; three cases of phlebitis; two of retained secundines; two of thrombophlebitis and bacteræmia; one of pyæmia; four cases of ruptured uterus; one in which the house surgeon left three swabs in the vagina; four cases of active syphilis showing ulcerative lesions; one of Bartholinian abscess; four of eclampsia; two of puerperal insanity; five cases of pyelitis; two of cystitis; one of scarlet fever; one case of pneumonia; two of acute miliary tuberculosis; and one of suppurating ear, giving a total of seventy cases in which at some time or other a demonstrable lesion was discovered. In the other four hundred and six cases no demonstrable lesion ever developed. Two additional points may here be brought out:

1. Of these seventy cases that did develop some demonstrable lesion there were very few in which that lesion manifested itself until after the patient had been running a septic temperature for some time.

2. Of the four hundred and six cases with no demonstrable lesion, over 80 per cent. simply had a slight rise of temperature seldom going beyond 101° and only lasting for a few hours, clearing up spontaneously without any treatment. The rest either ran a higher temperature or had a mild degree of fever lasting for some days.

Let us now compare with this the series admitted to the gynæcological wards from outside. The very reverse is true. Only fourteen of these ninety-seven cases failed to develop some definite anatomical lesion. There were thirty cases of cellulitis, twenty-eight of thrombophlebitis and bacteræmia, one of pyæmia, twenty-two of pus tubes, five of retained secundines, three of sloughing tears, two of phlebitis, one of pyelitis, two of pneumonia, two of miliary tuberculosis, and one of appendicitis. It will be noted that some of these cases had more than one type of lesion. It will be seen, therefore, that while the great number of those cases developing fever in our own wards cleared up without ever

being seriously ill or developing any definite anatomical lesion, practically all of those cases sent in with fever from outside did develop such lesions. The explanation of course is that all cases of morbidity turning up outside the hospital never reach our service, but it seems fair to presume that the proportion will be as great, if not greater, than that in our own wards. We would also call attention to the great variety of different lesions which may develop in patients who show fever during the puerperium. We believe in the active treatment of any of these lesions when it is obviously indicated, but the point that has been impressed upon us by this study is the inadvisability of any active treatment until such lesions and such indications are present. Any active routine obstetrical treatment instituted early in the course of fever would have led to that treatment being carried out in such diverse lesions as pus tubes, tuberculosis, suppurating ears, scarlet fever and bacteræmia, not to mention the fact that that same treatment would also have been administered to four hundred and twenty patients who never developed any anatomical abnormality.

The day of the puerperium on which the patient developed her fever is also instructive. In the case of cellulitis the average day for the fever to develop was the fifth, and of those developing before this time the majority were due to criminal abortions. The fever in the case of pus tubes usually began about the tenth day, if the lesion followed labour. In the case of abortions it developed much earlier, the average being on the second day. Thrombophlebitis also showed an early rise of temperature, usually about the second day. The same is true of those cases which showed no lesion, although an occasional case late in the puerperium would have a sudden rise of temperature lasting for a few hours but quickly dropping to normal and causing no future disability. These facts we also feel show the inadvisability of instituting any active treatment before definite lesions are developed. Those cases in which fever develops early we have found usually have no lesion, in which case they will clear up quickly, or are the thrombo-phlebitic or bacteræmic types where operative procedures are going to do no good and will likely do much harm.

Our routine method of investigation of cases developing fever in the puerperium, is to make a general examination of the patient to find if there is any possible cause for the fever extragenitally. The patient's mouth, throat, lungs, and heart are investigated, the urine is examined for pus and the kidneys palpated for tenderness, blood count and blood cultures are taken. The

uterus is palpated through the abdomen, its size, mobility and tenderness noted. No vaginal examination is made at first. We have ceased to take swabs from the interior of the uterus for bacteriological examination. If the perineum has been torn and stitched, it is inspected, and if red or inflamed looking the stitches are removed. Our reasons for abstinence from further pelvic examination are:

1. We find in 85 per cent. of cases which have some fever in the puerperium that the fever subsides in a short time and the patients never develop any demonstrable pathological lesion.

2. Pelvic examination very seldom reveals anything definite until the fever has been present for some little time.

3. Pelvic manipulation, specially if carried out roughly may convert what was at first a mild local infection into a more virulent pelvic inflammation or into a general bacteræmia.

Our abstention from local pelvic examination in the early stages implies likewise abstention from any local treatment. We believe we have got better results by the abolition of the routine vaginal or intra-uterine douche in cases of fever in the puerperium.

The great lesson which the figures which we have quoted seems to teach is that in cases of fever in the puerperium, recovery will take place without any bad effects in the vast majority, viz: 85 per cent. of the cases. In the remaining 15 per cent. the pelvic conditions that are present accounting for the fever may be infection of perineal, vaginal, or cervical tears, pelvic cellulitis, pus tubes, thrombo-phlebitis, or bacteræmia. All of those conditions result from the implantation of organisms into some part of the genital track from without, or their settlement there after having gained access to the blood through some extra-genital source. In the case of sloughing tears of the perineum or vagina, the infection can undoubtedly be limited and controlled by the removal of sutures, with the free opening up of the wound. Where the infection is in the uterine cavity, drainage is free and can be aided by posturing the patient.

An intra-uterine douche, the finger, or a curette, can never remove all the organisms or all of the infected tissue from the interior of the uterus, and all of these agencies may do much harm by opening up lymphatic channels and blood vessels to the invading organisms and so converting a local into a general infection.

We recall one case four years ago where we used a dull curette very gently in such an infected uterus. Prior to this being done repeated blood cultures had been negative. Twenty-four hours after the operative interference streptococcus was demonstrated in the

blood and the patient died two days later. We have seen a great number of cases admitted to our gynæcological wards with extensive cellulitis, where a curettement had been done by the outside physician. In a number of cases of bacteræmia admitted there was a similar history of operative interference.

Of the patients delivered in the hospital and under our care from the beginning, in whom the policy of non-interference was carried out, we had only nine cases of cellulitis, two of bacteræmia, and six of pus tubes. In the ninety-seven cases admitted from outside, in a very large number of which there had been intra-uterine manipulation carried out subsequent to the rise of temperature, there were thirty cases of cellulitis, twenty-eight of thrombo-phlebitis and bacteræmia, and twenty-two of pus tubes. In those latter cases of course we have no record of the total morbidity with which to compare them, but the figures given are significant.

CONCLUSIONS

1. That in the great majority of cases, viz., 85 per cent., developing fever in the puerperium the fever quickly subsides without any definite pathological lesion developing.

2. When a definite pathological lesion does develop it does not manifest itself for some little time after the first rise of temperature.

3. When a definite pathological lesion is present in the pelvis the infection starts as a wound infection of some part of the genital tract, namely:

- (a) An ulcer of the perineum, vagina or cervix,
- (b) Infection around sutures,
- (c) Infection of retained secundines,
- (d) A localized infection of the interior of the uterus, in which case it will likely be at the placental site.
- (e) Or it may be a primary blood infection, in which case it is of the autogenous type.

4. The primary infection may remain localized for varying lengths of time or it may spread by:

- (1) Continuity of tissue,
- (2) The blood stream,
- (3) The lymphatics,

and it may spread in any of these ways from any given primary focus. For instance we may get a pelvic cellulitis from an infected perineal suture, from a torn cervix, or from an infection of the placental site.

5. The lesions arising from the spread of infection by continuity of tissues are usually either pus tubes, pelvic peritonitis, or a general peritonitis. Any of these conditions may arise from various organisms, but the two commonest are the gonococcus and streptococcus, and they usually present different clinical pictures. The lesions due to the gonococcus are ordinarily developed late in the puerperium, especially if the infection has followed labour, whereas with the streptococcus we find that the initial symptoms appear earlier and the prognosis is graver.

6. Infection spreading by the blood stream is usually of the thrombo-phlebitis type, which ordinarily begins in the thrombosed veins of the placental site, though it may occasionally arise from primary infection in the perineum or vagina. The terminal results are localized abscesses in the wall of the uterus, pyæmia, or septicæmia. We had one case in which apparently the septic process broke through the wall of the vein late in the disease and gave origin to a widespread cellulitis which suppurated four months after the primary rise of fever, the patient recovering after the abscess had been opened.

7. Infections spread by the lymphatics in most instances give rise either to a cellulitis or to septicæmia. In the case of cellulitis, the original focus is usually in the cervix or the uterus, though it may arise in the vagina or perineum. The lymphatic type of septicæmia is the most serious of any of the puerperal infections arising early, leaving no local lesions and ending in the death of the patient in most instances.

8. It is our opinion that the type of organism is not of as much importance as the situation in which that organism is growing, that is, as the anatomical lesion. For instance, one may get a fatal bacteræmia as well as pus tubes due to the gonococcus, or a cellulitis or a thrombo-phlebitis as readily as the so-called sapræmia in the case of the streptococcus.

9. We have at present no means of treating primary infection in the uterus which does not at the same time favour extension of the inflammatory process of the surrounding tissues or the blood stream.

10. Therefore, all cases should be treated expectantly during the early stages.

11. When a definite pelvic lesion does develop it should be dealt with along the lines of established procedures.

12. The pathological process of puerperal fever is the same whether the sepsis follows labour or abortion.

THE ESSENTIALS OF SUCCESS IN PROSTATIC SURGERY

BY ERNEST M. WATSON, A.M., M.D.

Buffalo, New York

THE gratifying reduction in the mortality following prostatectomy during the last ten years, in the hands of those making a study of urinary obstruction, has been keenly appreciated. At the present time in some clinics¹ it is less than 4 per cent. in hundreds of operations covering a period of several years. One naturally inquires what has been the cause of this success, and what new light has been shed on a formerly rather discouraging field of operative surgery. Operative technic, it is true, has greatly improved, but perhaps the greatest factor in making prostatectomy an operation of choice rather than an experience with uncertainty has been the careful study of the individual patient, and the determination of his physical index by the more modern clinical and laboratory methods.

1. The correct diagnosis of the nature of the obstruction is still, as always, one of the first steps in the proper handling of these cases for without this future intelligent management is severely handicapped, if not impossible.
2. Of paramount importance, and carrying the greatest responsibility for the surgeon, is the determination of the exact physical status of each patient individually. Upon this, supplemented by the appropriate preparatory treatment, depends in the greatest measure the success or failure of the operation.
3. Directly associated with the preceding, and at its culmination arising from it is the selection of the proper time for operation. To answer this the judgement of experience is necessary, together with the ability to interpret correctly the clinical and laboratory findings.
4. Following this the choice of operation must be made. This too, is a matter of judgement in which the type of obstruction, the condition of the patient and the familiarity of the surgeon with any given method all play an important rôle.
5. Lastly the operative after-care must be considered with the ability to recognize compli-

cations and to handle them in a manner that assures the patient the greatest comfort and ultimate success.

In the diagnosis of prostatic hypertrophy there are two accepted methods of procedure, first rectal examination which will reveal the amount of hypertrophy pushing backward into the rectum. In this way can be noted the size, shape, outline and consistency of the prostate. Also the amount and character of the induration and adhesions present can be felt, whether the median furrow has been obliterated, and the nature of the notch above the prostate. This study enables one to differentiate with great accuracy between a simple benign hypertrophy and a carcinomatous induration. In addition the size and character of the seminal vesicles can be determined with the presence of induration and adhesions if any, and too, the condition of the posterior bladder wall between the vesicles. The presence or absence of palpable pelvic glands should also be noted, for these are of considerable importance in cases with suspicious areas of induration. The presence of blood should also be looked for on the examining finger, and finally a note made on the condition of the rectal sphincter. The relaxation of the sphincter, with only a small amount of prostatic hypertrophy, in conditions of urinary obstruction is often the suggestive point in suspecting a tabetic bladder, which possibility always has to be borne in mind.

Supplementing the rectal palpation there should be a cystoscopic examination to determine the amount of residual urine and particularly to observe the position and type of the intra-vesical prostatic hypertrophy. The rectal findings cast no light on the character of the intra-vesical enlargement and this is a highly important matter. The hypertrophy, intravesically, may involve the middle or lateral lobes, the Albarran group of glands or the sub-trigonal group singly or in various combinations. Very rarely is the anterior lobe involved. There may be no actual lobe formation but rather a "bar formation" in the medium portion, or occasionally a circular or ring shaped hypertrophy in the form of a "collar" about the vesical orifice. The determination of the exact type of prostatic obstruction is imperative for a correct handling of the case at operation.

Every prostatic presents an individual problem in the matter of ascertaining his physical preparedness for operation. Most of these men have had obstruction to urination for some time with a certain amount of damage to the kidneys from back pressure of varying extent. As an index of renal impairment the phenol

sulphone phthalein test is the best means of study we have at the present time. After relieving residual urine by catheterization, phthalein tests should be done twice a week in order to have an interval record of the exact working capacity of the kidneys. The treatment for these cases should be the forcing, of water i.e., from two and one half to three litres in twenty-four hours, with courses of urotropin (15 grs. three times a day), and the relief of the residual urine by interval catheterization or by the inlying retention catheter. With a phthalein output of much less than 30 per cent. the first hour, this preparatory treatment is indicated. Particularly is this true if there has been much residual urine, i.e. 400-500 c.c. After the first phthalein test there is frequently a fall in the phthalein output but in a few days the recovery of the kidney function is evidenced by a definite rise in the output until a period of stability is reached. This in some instances may be several times the output on admission.

As additional data in individuals presenting a very low phthalein output, even without signs of acidosis, information obtained from the determination of the blood urea (Marshall's method)² is extremely valuable. When the urea content is much above 3.5 or 4 grams per liter there is definite retention of waste products. Cases with a blood urea of over one gram per liter or about three times normal, by the above methods can usually be prepared for operation in several weeks. In impending acidosis the determination of the hydrogen ion concentration of the blood and the carbon dioxide content of the alveolar air give valuable supplementary data as to the exact condition of the patient in terms of almost mathematical certainty. In this condition free catharsis, with sodium bicarbonate by mouth, and at times infusions of glucose (5-10 per cent. solutions), with occasionally lactose per rectum (one and one-half ounces to 500 c.c. of fluid) is of inestimable value. Aside from the effects of urinary back pressure these individuals not infrequently have other lesions which preclude immediate operation, namely various infections of the urinary tract, cardiac disease, cardio-renal involvement and arterial hypertension. Each of these conditions in turn deserves its own special consideration and treatment and for no patient can a stereotyped form of preparation be laid down. The success in prostatectomy comes not always to the operator who is most dexterous in his technical manipulations, though this is important, but to him who makes use of the newer methods in studying his patients and is able to interpret correctly the clinical and laboratory signs of preparedness.

When to operate is a question that has to be answered separately for each patient. In cases of urinary back pressure a plane of renal stability must be reached as shown by a constant level of the phthalein tests. Cases with a function much below 30 per cent. the first hour should be given the advantage of drainage to improve the output. With urinary infection and possible pyelitis or pyelo-nephritis no patient running a temperature should be operated upon. Epididymitis, a not uncommon concurrence, should contraindicate immediate prostatectomy. Evidences of a lack of cardiac compensation or a pronounced cardio-renal involvement should deter operative interference until a time when the risk is reduced to a minimum. Hypertension with a blood pressure running over 200 mm. should be regarded with hesitation. It is possible for these patients to undergo a radical cure successfully but careful rest in bed with continuous drainage is essential. Many individuals, after fifty, have a certain amount of glycosuria and this immediately brings up another phase of operative risks which demands careful study and adjustment before one is justified in attempting any surgical procedure.

The choice of operation depends largely upon the type of prostatic obstruction. To one unfamiliar with the perineum, however, the suprapubic route will probably give better results. But from the unbiased reports of various operators³ this method is unquestionably followed by a greater mortality. This is due to several factors of which may be mentioned greater surgical shock, more frequent hæmorrhage, greater danger from sepsis due in considerable measure to infection in the space of Retzius, less perfect if not poor drainage and a longer period in bed, i.e. ten days to two weeks. The perineal route of approach in properly trained hands undoubtedly gives a lower mortality. In a series reported by Young⁴ some years ago he had one hundred and twenty-eight consecutive cases without a death. More recently⁵ from his clinic for one year (January, 1915—January, 1916) are reported ninety-four consecutive cases (ninety perineal and four suprapubic) with one death and that individual ninety-three years of age who died on the thirteenth day after operation of cerebral thrombosis. This case the writer personally had the care of and can state that the patient was up in a chair and walking about the ward for several days before his thrombosis. For the older men, particularly, the perineal method is the approach which gives them less shock and there is practically never any abdominal distention following it. There is less danger of secondary bleed-

ing for the disturbing vessels can be ligated readily at operation and when necessary, which is rare, subsequent packing can be easily carried out. The drainage is dependent and there is no annoying abdominal wound. Patients are out of bed on the third day after operation. Certain pedunculated lobes and others that cystoscopically show considerable enlargement within the bladder are unquestionably easier removed supra-pubically, but through the perineum they can be enucleated and careful exploration of the vesical orifice with the finger afterward will tell the operator whether he has the entire obstruction removed so that there never should be any error in this regard. Perineal prostatectomy is without doubt a more difficult operation for the surgeon but is easier for the patient both at operation and during his convalescence.

In prostatic obstruction with no enlargement as in the so-called "medium bar" cases or even those of "collar" formation about the vesical orifice a prostatectomy is not indicated, nor is it necessary. The punch operation⁶ will relieve these conditions even when there has been complete urinary retention. This procedure done under novocaine, entirely through the urethra, necessitates remaining in bed only two days and allows a patient to leave the hospital in less than a week. It requires, however, an application to the suitable cases only, which can be determined solely on careful cystoscopic examination.

In cases of real intra-vesical hypertrophy with grave cardiac or other complicating factors such as marked hypertension or severe glycosuria, which conditions absolutely contraindicate any radical operation there is still a procedure which will relieve their obstruction. This is the application of radium within the urethra to the hypertrophied lobes by certain special instruments over a period of time. The action of the radium causes a shrivelling or contraction of the projecting masses to a degree that finally permits the successful employment of the punch operation to complete the removal of the obstruction. The details of this procedure with a case instance has recently been reported by Young.⁷ The writer had the opportunity of caring for the case cited above during his entire treatment which extended over a period of nearly a year and cannot attest too strongly of the success of the above management in certain desperate cases.

Of the complications following prostatectomy by the perineal method they are relatively few. Secondary hæmorrhage is rare. It usually occurs after the removal of the perineal drains and

continued pressure on the perineum is often sufficient to control it; if not, repacking the perineal wound is easily accomplished. If the bleeding is intra-vesical a large Coude catheter (No. 30F.) introduced through the urethra and morphia to keep the patient quiet is practically all that is necessary. Rarely a few days after the removal of the gauze drains a moderate intra-vesical hæmorrhage may occur, this too is controlled by the insertion of a large catheter through the urethra and the use of sedatives. Occasionally an acute retention due to spasmodic contracture of the internal sphincter and vesical orifice or the lodging of a blood clot in the urethra may occur, this in turn is readily overcome by the insertion of a large catheter through the urethra into the bladder. An epididymitis sometimes occurs but this is usually not annoying and support to the scrotum with hot applications, and in the more painful cases the use of lead and opium compresses, controls the situation. Practically never does this go on to abscess formation which requires opening. Infection of the wound is also very rare; when it does occur the cutting of the skin stitches with the opening of the wound followed by antiseptic irrigations suffices. Thrombosis of varying extent occasionally happens and when it does absolute quiet is the essential treatment with such symptomatic management as is indicated.

BIBLIOGRAPHY

1. YOUNG and FRONTZ.—*Jour. A.M.A.*, vol. lxviii, p. 526, February 17th, 1917.
2. MARSHALL.—*Jour. of Biological Chemistry*, vol. xiv, p. 283, 1913; vol. xv, p. 487, 1913.
3. GILE.—*Boston Med. and Surg. Jour.*, vol. clxxvi, p. 587, April 26th, 1917.
4. YOUNG.—*Jour. A.M.A.*, vol. liv, p. 784, March 5th, 1910.
5. YOUNG and FONTZ.—*Jour. A.M.A.*, vol. lxviii, p. 526, February 17th, 1917.
6. YOUNG.—*Jour. A.M.A.*, vol. lx, p. 253, January 25th, 1913.
7. YOUNG.—*Annals of Surg.* vol. lxv, p. 633, May, 1917.

THE ESTABLISHMENT OF A FEDERAL BUREAU OF HEALTH

By J. B. BLACK, M.D.

Windsor, N.S.

IN moving this resolution, I am convinced that the introduction of a speech or essay on thesis on the merits and benefits of a federal bureau of public health, before this meeting, made up of medical men so well informed on the subject, would be largely out of place. Where there is neither lack of knowledge nor indifference, to plead the cause would be superfluous. Little need be said beyond endorsing the resolution, of which I am sure, all approve. It may surprise some of you to know, that for some years after Confederation, there was a federal bureau of public health, under the Department of Agriculture; and the late Dr. Tache was the secretary.

By an Act passed early in 1868, it was declared that "The administration of the subject of public health is joint between the Dominion and the Provinces in virtue of the Act of Confederation.

Preventive medicine was in its early infancy when the British North America Act was framed, and its provisions largely referred to the prevention of the introduction from other countries of contagious diseases, and the care of the insane. There seems to have been no apprehension of the ability to prevent the many diseases originating in the country. Even at that, the Dominion government seems to have appreciated its responsibility in regard to public health. From 1868 to 1872, a federal bureau of public health was maintained by the government. What small amount of attention is now paid to public health by the federal government, is strangely divided between the Department of Marine and Fisheries, the Department of the Interior, the Department of Agriculture and the Department of Inland Revenue. Latterly it has been still further subdivided between the Conservation Commission and the Society for the Prevention of Tuberculosis. And again the care of tuberculosis is divided between this latter and the Conservation Com-

Read at the forty-eight annual meeting of the Canadian Medical Association, June 14th, 1917.

mission. Then there is the National Council of Health under the Conservation Commission which has been granted power to advise federal and provincial governments in matters pertaining to public health. Here, certainly, many cooks have bedeviled the broth. If union is strength, the converse is also true: in division, there is weakness.

Our provincial governments have done splendid work for the prevention of diseases but their work can only be provincial. They cannot reach where federal authority could, and should. And in some provinces the available funds are not equal to the commendable desires of the department.

I need not emphasize here what a stimulus, what an incentive and example, and above all, what great assistance a federal bureau would be to the several provincial boards, not in money grants, but in departments where the province has no control: the establishment of a much needed national laboratory can only be accomplished by federal authority (and I regret to say that the Order-in-Council, 1911, to establish a laboratory, has never been carried out). The prevention of the pollution of international and interprovincial waters. The sanitary supervision of international and interprovincial passenger travel by land and water: that railway sleeping cars and steamer state-rooms may no longer be a menace to public health. The greatly needed better control of venereal diseases, tuberculosis, typhoid, and other infectious and contagious diseases. The education of the people by press and platform in sanitary matters! But it is a waste of time of this well informed association to enlarge on the activities awaiting a federal bureau of health, in this great field already ripe for the harvest. The pressing needs of a federal bureau of health are now greater than ever. It is a war measure of first importance. Extra and unusual measures must be taken to make good to Canada the enormous loss of our young men in this war. Thousands of our boys have fallen in France and Flanders—a necessary and voluntary sacrifice in the cause of liberty and humanity, while thousands of those needed to take their place in civil life after the war are allowed to die needlessly, in the cause of nothing but ignorance and neglect.

Thousands of children are dying every summer in the cities all over this Dominion who could be saved, who should be saved to the nation with organized and intelligent endeavour. It is the consensus of the judgement of men in position to know who have studied this question, that 50 per cent. of deaths in early childhood can be prevented, and 33 per cent. of adults under seventy years of age.

When Straus established his pure milk depots all over New York City, infant mortality there dropped 50 per cent. inside of two years.

We have imported at great expense, people from every misgoverned country in Europe—many of them unfit for Canadian citizenship, in order to swell our population, and at the same time we have let our own die for want of intelligent care and protection.

Our federal government has given much care—and commendably so—to the health of hogs, cattle, and sheep (about half a million dollars annually). It has equipped a fine laboratory, with a large staff of veterinary surgeons for this purpose. But how little for young children, young men and young women who mean so much in the development of this young nation. If we need more wheat, more potatoes now, do we not need more live babies and fewer dead ones in Canada?

Evidently the important question propounded centuries ago in Oriental literature: "How much better then is a man than a sheep?" has not been pondered or answered by our federal governments.

China or India might stand unmoved at an infant death rate such as ours, but here it is deplorable, almost criminal.

At the present time college men and educationists are giving addresses on the necessity of introducing science and the establishing of laboratories for scientific research, in connexion with our factories and industrial pursuits, in order that we may compete with Germany and other countries, and to attain and hold our place in the sun as a manufacturing country. We are also beginning to adopt rational and intelligent and organized efforts to conserve our national resources; yet nobody but the few are urging scientific methods to prevent the loss of our population by death, to conserve the lives of our people, and intelligently to reduce sickness, suffering and premature death.

The most important subject for consideration by the government is relegated to the most obscure place. If it be true as an authority has stated, that "No public expenditure can be as rewarding as well directed expenditure on the public health", then we ask with all assurance the government's earnest consideration of a federal bureau of health, a bureau not tacked on to agriculture or marine and fisheries or any association or commission, but a bureau separate and apart from any other. A department demanding the best brain and energy in the medical profession of Canada.

Case Reports

TWO CASES OF SINUS THROMBOSIS AND JUGULAR RESECTION

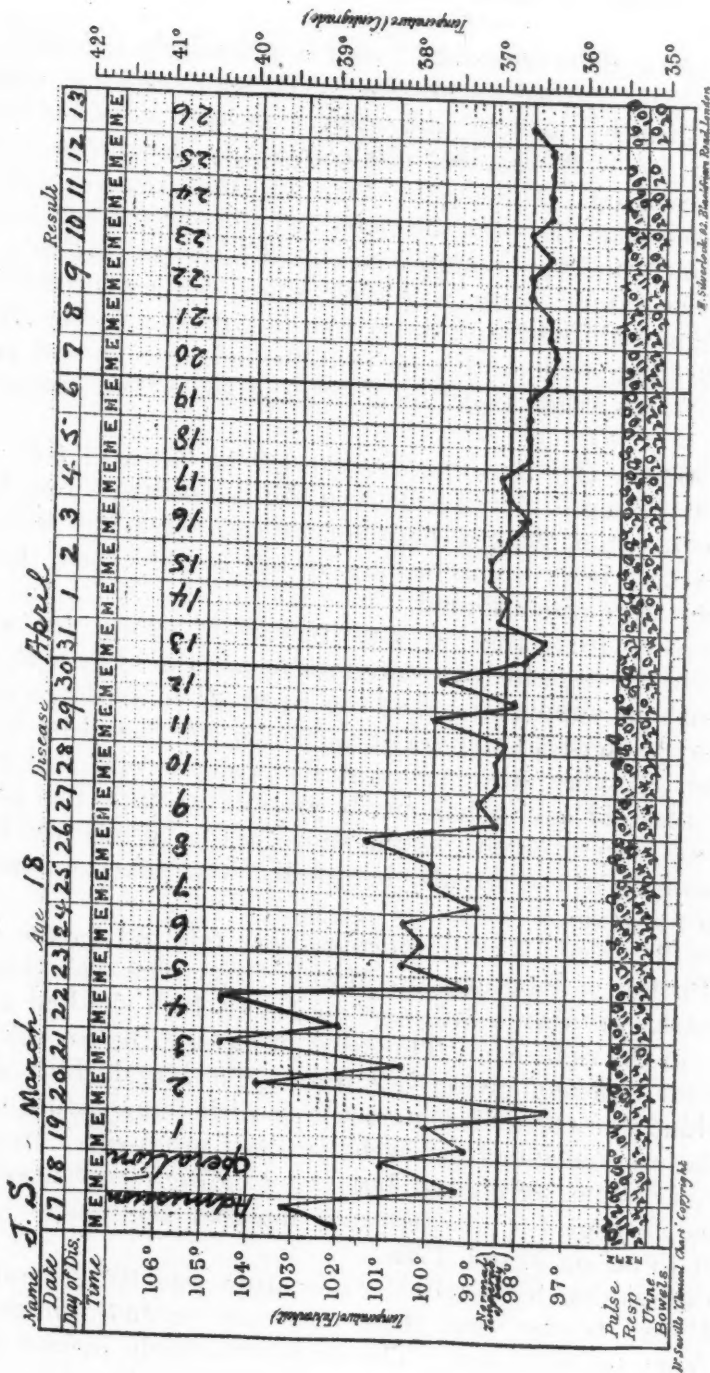
BY R. S. MINNES, M.D.

Ottawa

WHEN I was kindly asked by our chairman to give a paper at this meeting of the Canadian Medical Association, I promised to give some case reports and later on, receiving a request for a title, it happened that I had under my care two cases of infective sinus thrombosis which were of interest to me and I beg to present them briefly. The two patients were sent to me on the same day from out of town suffering from acute ear trouble following measles, and both rapidly developed symptoms of infective sinus thrombosis.

Case 1. James S., age eighteen, was referred to me by Dr. S. H. Murphy, of Renfrew, on March 17th 1917. On February 12th he had an attack of measles and was in military hospital three weeks. There or four days after leaving the hospital the right ear ached with a cold and he was sent again to hospital. A week later the ear broke and discharged, and it continued to run until he came under my care, profusely at first and very little for a few days later. The ear continued to ache all the time and the mastoid was tender from the beginning. On the evening of March 16th he was very sick and the temperature rose to 105° without a chill. He was then sent to me.

When I first saw him, temperature was 103.1°, the right ear was discharging, glands of the neck were swollen, the mastoid was very tender but no swelling, and the patient was drowsy. There was marked bulging of the posterior segment of the drum. The drum was freely incised under a general anæsthetic and hot irrigations of the meatus and ice bag to the mastoid used. Twenty-four hours later the temperature had gradually fallen to normal and he expressed himself as feeling very well. Two hours later as I was about to leave the hospital a message was brought me that he was having a chill and the temperature rose to 101°. I de-



cided to operate without delay and did so with Dr. Mahood's assistance.

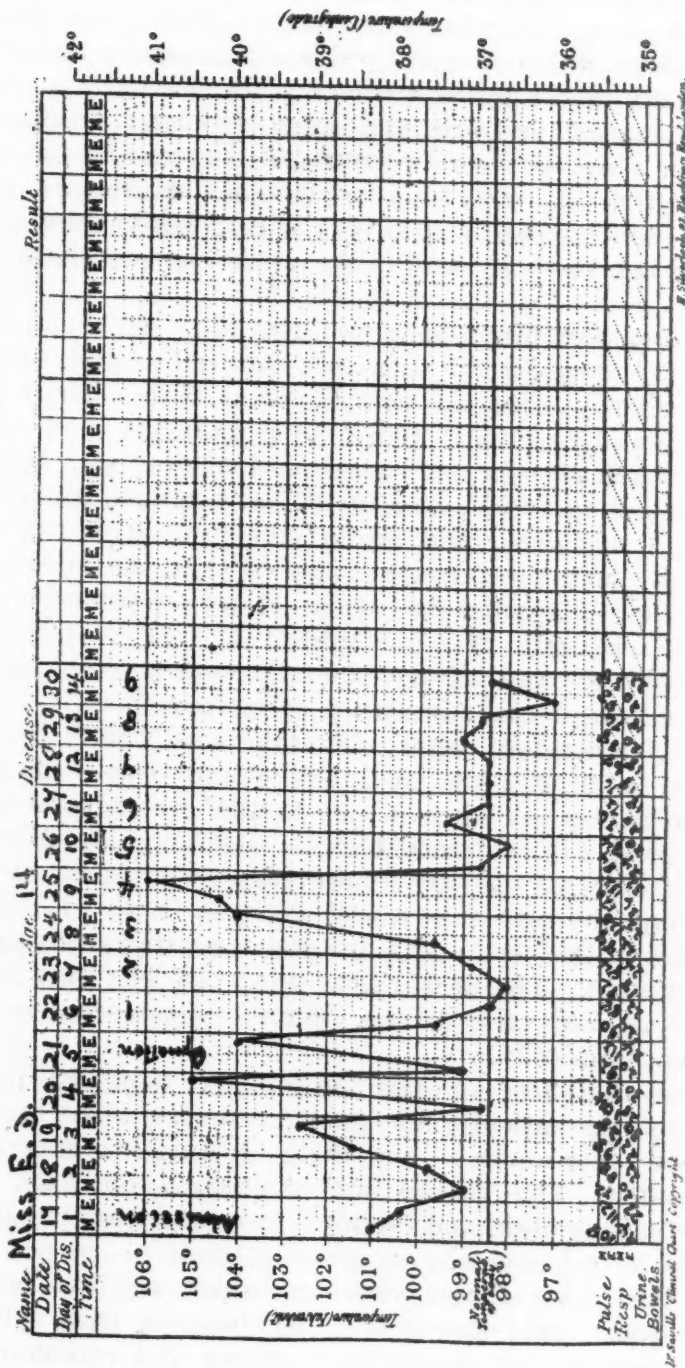
On opening the mastoid I found it extensively involved, much free pus and a perisinous abscess. The sinus-wall was dark and far from healthy looking and after exposing the sinus freely I opened it. A well organized clot completely obstructed it and no bleeding resulted. The jugular vein was then tied off well down in the neck and the vein dissected to well above the temporo-facial branch and the wound was closed after putting in a gauze drain. The lateral sinus was then followed back nearly to the torcular herophili and well down to the bulb before bleeding was obtained. The sinus walls were removed, the wound packed, an intravenous saline injection given and the patient returned to bed.

On March 19th the temperature fell to 97° at 4 p.m., rising to 100° at 12 p.m. On March 20th the temperature rose to 104° at 10 p.m. It continued high for several days but with daily dressings and intravenous salines it fell to 99.3°, on the 23rd, when they were discontinued.

Recovery from this on was uneventful except for a slight phlebitis in the leg which appeared on April 6th. The neck wound closed without suppuration and on April 24th the large exposed area over the mastoid and occipital region was closed by a plastic operation. A very small sinus at its posterior end still remains and the mastoid cavity has nearly granulated up. The posterior wound was very extensive as the sinus had to be followed back to within an inch of the torcular herophili. The infection was streptococcus pyogenes.

Case 2. Eva D., age fourteen, was referred to me by Dr. W. W. Buttle, of Kinburn, on March 17th. She was taken sick with measles on March 3rd, and on March 10th she had a severe ear-ache in the right ear. The drum broke and the ear discharged freely next morning giving her relief. On March 13th she had pain behind the ear and some swelling with temperature of 101°, while the ear continued to discharge very profusely. Hot applications of iodine were used but her condition continued about the same, except for an increased mastoid tenderness and she was sent to me on March 17th.

On admission to hospital temperature was 101.2°, pulse 108, mastoid very tender, and there was very profuse purulent discharge from the right ear. The drum was freely incised under a general anæsthetic and hot boracic irrigations of meatus and ice



bag to mastoid employed. The temperature fell to 99.2° at midnight and the next day the maximum was 99.4° . On March 19th the discharge was still very profuse, temperature rose to 103° , mastoid very tender and operation was decided on.

The mastoid was firm and large with large pneumatic cells filled with a sticky mucoid secretion and extending far back and into the tip, the streptococcus mucosus capsulatus infection. The sinus was far back and as its covering was healthy it was not disturbed but the bony wall of the whole sigmoid sinus was laid bare.

The temperature remained high, viz., 102.3° at midnight and the following day at noon rose to 104.3° , falling to 98.3° at 4 p.m. Shortly after she complained of feeling chilly and the temperature rose to 105.1° , pulse 112 at midnight.

On March 21st she was restless and vomited and the temperature after falling to 99° , rose to 105° at 6 p.m. Assisted by Dr. Mahood, I uncovered and opened the sinus with free bleeding from both ends, then, feeling satisfied that the infection came from the bulb, I resected the jugular, closed the wound in the neck except for a cigarette drain, completed the treatment of the sinus and mastoid, gave an intravenous saline and returned the patient to bed, ordering rectal stimulation every four hours.

The temperature after operation was 106.3° by rectum, but it fell to 98° at 2 p.m. and remained down until the following afternoon at 4 p.m., when it rose to 104° , the general condition keeping good. It continued high the following day, March 25th, and at 10.30 p.m. was 106° , pulse 132, accompanied by a slight chill, falling the next day, March 26th, to 98.3° , when I opened the wound in the neck and found the same sticky pus present as in the mastoid. The neck was cleaned and left open and moist dressings applied; also 10 c.c. of anti-streptococcus serum was given hypodermically.

From this time on the temperature remained practically normal and the patient made a rapid recovery. The neck wound was closed again under an anæsthetic on April 9th and very little scar resulted. The patient was discharged on April 21st. I saw her on May 30th, and the mastoid wound was epidermized.

This second case was of special interest to me because of a similar case some three years ago which resulted fatally. It was the same rapid severe infection, jumping from cell to cell, skipping several, but reappearing beyond and extending to the most extreme confines of the cellular bone, the cells being filled

with the sticky muco-pus of the streptococcus mucosus capsulatus. In this case at a second operation, I opened the sinus because of a chill and rise of temperature to 105°, but with very free bleeding from both ends, I desisted, after consultation, from tying off the jugular. Each day afterward regularly came the chill and rise of temperature to 105°. Blood culture gave streptococci but the serum prepared was ineffectual in averting a fatal termination.

It is possible that this case was one of septicæmia developing from the mastoid bone without involvement of the sinus or jugular bulb, but I am inclined to regard it as due to a parietal non-obstructive clot in the bulb and for this reason I had no hesitation in resecting the jugular vein in Case 2. Kerrison in his valuable work on "Diseases of the Ear" says: "When we have assumed the responsibility of opening a sinus on account of symptoms of septic absorption, we should in every case further safeguard the patient by ligation or resection of the jugular vein," and I think this is a safe principle to follow.

In a recent paper, Dr. Holinger, of Chicago, advocates the principle of non-interference with the sinus and jugular vein in these acute cases. He holds that after carefully removing surrounding infected material and tissue such as pus and diseased bone, with the least possible disturbance to the sinus, nature will in most cases do the rest. He says: "Experimenters agree that sinus thrombosis has a very great tendency toward healing if we only succeed in keeping reinfections (perisinual accumulations of pus) away. The blood current will get rid of the thrombosis, sterilize, organize and absorb if we only take care that the endothelium is not lacerated." Koerner, he says, "showed that the mortality after ligation of the jugular vein is not less than we thought"; also "Sneider had without ligation one death in thirteen operated cases or 92.03 per cent. of recoveries," and "Sneider drew the conclusion that ligature of the jugular is superfluous and worthless in almost all cases of acute suppuration". Ligature of the jugular is reserved for very old cases with extensive metastatic abscesses.

My own experience, a very limited one of about nine cases, leads me to the opposite view. Early operation on the sinus and jugular as soon as the diagnosis is made and before the system gets flooded with septic material usually results favourably.

Of these nine cases one was too septic when sent to me to hope for a favourable result; another was a case of long standing with collapsed jugular and very extensive involvement of the petrosal

sinuses as well as the lateral sinus so that practically no flow of blood could be obtained; another was the case referred to in which I did not remove or ligate the jugular. The other six cases were recent cases and all did well after operation.

MERCURY POISONING WITH ANAPHYLACTIC
PHENOMENA AND FATAL ISSUE
FIFTY-TWO DAYS LATER

By

A. ROCKE ROBERTSON, *Captain C.A.M.C.*, OFFICER IN CHARGE
MEDICAL DIVISION

AND

A. GRANT FLEMING, *Captain C.A.M.C.*, OFFICER IN CHARGE
LABORATORIES

*The Duchess of Connaught Canadian Red Cross Hospital,
Cliveden, Taplow, Bucks*

WHEN poisoning with corrosive sublimate taken by mouth ends fatally, death occurs either rapidly or it may be delayed for several or many days, apparently depending upon the amount of the poison absorbed. Aitchison Robertson states that the most rapidly fatal issue recorded in the literature resulted in one-half hour, and Whitthaus gives twenty-five days as the longest recorded period in the so-called delayed cases. It is usual, though, for a rapidly fatal case to terminate in about six or eight hours, and the delayed cases seldom survive the same number of days.

In rapid cases the drug appears also to produce severe shock, for in a case recorded by Paccinotti, death ensued "promptly" upon irrigation of a ruptured uterus. A case which one of us (A.R.R.) autopsied some years ago, can hardly be explained otherwise, as death ensued in about ten minutes.

A healthy girl of eighteen left her parents down stairs to go to her room above. Presently they heard a heavy thud and a moment

later found the girl seated on the floor leaning against a bed-post, very pale and breathing with difficulty. They placed her on the bed and, according to their statements, breathing ceased in about ten minutes. At autopsy, bichloride of mercury was found in the stomach contents. The outstanding anatomical feature was venous engorgement of the splanchnic vessels and intense hyperæmia of the kidneys, especially of the capillary tufts.

In another case which one of us (A.R.R.) autopsied, in which death took place five hours after the poison was administered, there was probably a combination of shock and toxic activity of the causative agent.

A pregnant woman, of twenty-five, was obliged to have the uterus emptied on account of pernicious vomiting. The uterus was afterwards washed out with a strong solution of corrosive sublimate. Upon coming out of the anæsthetic the abdomen was rigid and very tender. She was very pale, the pulse rapid and small. In this condition death ensued in about five hours. At autopsy, a hole was found in the fundus, caused by the curette, and bichloride solution was found in the peritoneal cavity. There was intense injection of the splanchnic vessels, and the kidneys, in addition to hyperæmia, showed marked cloudy swelling of the epithelium of the convoluted tubules.

The case which we now report, in which the patient survived the poisoning for fifty-two days, is of much interest in that the longest period of survival hitherto recorded, according to Whitthaus, is twenty-five days. An attempt is also made to correlate careful clinical observations with gross microscopic findings post mortem, in the kidneys in particular, where one is now able to estimate fairly accurately what would have been the ultimate picture had the patient survived. In addition to this, the sudden onset on the thirteenth day of fever, chill and rash, which we interpret as an anaphylactic phenomenon, due to absorption of a large amount of protein altered by the poison, is of considerable interest.

J. G., age twenty-nine, has been brought up on a farm and has never had any previous severe illness. There is nothing of note in his family history. He enlisted in good health, in July, 1916, and shortly after contracted a severe cold with a bad cough, from the latter of which he entirely recovered. On October 15th he reached France and was able to carry on very well until December 1st, when he again got bronchitis. Two weeks later he reported sick but on examination there were no physical signs other than those of a severe bronchitis. The cough was unusually severe;

the sputum, abundant and muco-purulent, contained no tubercle bacilli. Two weeks later the bronchitis had almost completely subsided and the cough had also much abated. A week later he got mumps, bilateral, and seven days later the left testicle became swollen and tender.

Three days after this, in mistake for five-grain tablets of aspirin, prescribed for headache, an orderly gave him two 7-3/10 grain tablets of corrosive sublimate which the patient first placed on his tongue and immediately swallowed with a mouthful of water. He noticed that the tablets immediately began to dissolve on the tongue yielding a metallic taste, and after swallowing, he mentioned this fact to the orderly. The latter, realizing that he had made some mistake, summoned help at once. In about five minutes an emetic of mustard water was given, the patient having meanwhile voluntarily though ineffectually tried to vomit. He had felt only a slightly burning sensation in the stomach. Emesis was profuse following the mustard water. A few minutes later a concentrated solution of salt water was also given which produced more vomiting. Then the whites of two eggs were given and within half an hour a stomach tube was passed and the stomach thoroughly lavaged with warm albumin water. Following this, the patient felt only nausea with a mild burning sensation in the epigastrium.

During the following twenty-four hours, there was only a moderate amount of epigastric discomfort, a sense of warmth rather than of burning, with slight cramping abdominal pains at times. Vomiting occurred at intervals of about an hour, the vomitus being greenish, and at times tinged with bright red blood, and much mucous. Soon after the accident the bowels began to move; after the third motion the stools lost their faecal character and were replaced by small motions of serous character, containing much mucus and blood. Later on the stools had the appearance of laked blood of about a 5 per cent. strength. The temperature remained about normal, the pulse of good quality, 85, and respirations normal. Only seven ounces of urine were passed, of deep amber colour, containing about 1 per cent. albumen, numerous epithelial, hyaline and granular casts, some red blood cells and leucocytes. The skin remained absolutely dry and hot packs failed to produce sweating. In all, thirteen stools were passed.

2nd day. Seven sero-mucous stools, each tinged with varying quantities of blood. Much less griping. Urine only two ounces, with about 2 per cent. albumen and many casts. Still nauseated

and vomiting greenish fluid at intervals. Very little epigastric burning and no abdominal griping. Temperature up to 99°; pulse to 105. Systolic blood pressure 130.

3rd day. Condition remained the same; vomiting of greenish fluid, much uneasiness; two stools of watery character, and very little blood. No urine.

4th day. Four and one-half ounces of urine passed containing 1.8 per cent. albumen, many casts and fewer blood cells. Much nausea and vomiting, perspiring a little. Hiccough commenced and became very troublesome.

5th day. Vomiting less. Voided nine and one-half ounces containing 0.4 per cent. albumen. Some nausea and vomiting towards evening. Much hiccough.

6th day. Thirty-seven and one half ounces of urine with 0.4 per cent. albumen. Some vomiting and hiccough.

8th day. Fifty-five ounces voided, pale with only a trace of albumen, but many casts and blood cells.

9th day. Feels much better; thirty-nine ounces of urine with only a trace of albumen.

10th day. Much better but still nausea and vomiting.

The condition remained the same until the thirteenth day, when, during the night he had a chill, the temperature rose to 103.2° F. and he felt very uneasy. No cough and only the usual vomiting which, though it had diminished had never left him. A few hours later, a bright red macular rash, in places finely papular, appeared upon a slightly elevated, oedematous base. It was distinctly itching and was grouped in large irregular areas over the trunk and on the extensor and outer surfaces of the arms and legs. It was very faintly present on the forehead and cheeks, but was absent from the palms, soles, and mucous membranes. No catarrh of the respiratory passages, or injection of the conjunctivæ. The rash faded on pressure. The following day, it began to fade, the temperature was lower and he felt better. On the fourth day, the rash having completely disappeared, there was slight desquamation over the chest. The fever disappeared on this day.

From this time on until the end, his condition remained about the same, in that vomiting—sometimes only once or twice a day—persisted, with nausea, and he grew progressively weaker and thinner. Some days there would be a slight transitory elevation of temperature, but towards the end it tended to remain normal. The pulse became very small and the blood pressure fell. Three days before the end, the systolic pressure was 105. On the follow-

ing day he complained of considerable acute abdominal pain; twenty-four hours later he had a sudden seizure of very severe epigastric pain, when the abdomen was found to be very rigid in its upper half. Gradually he grew weaker and died eight hours later.

It is to be noted that the urine had shown a progressive improvement up to the twelfth day when he passed sixty-six ounces with a specific gravity of 1009, containing only 0.05 per cent. albumen, and only a few casts and blood cells. After this it began to fall in amount, while the albumen increased to about 0.1 per cent. This failure was attributed largely to the vomiting and the comparatively small amount of fluid taken. Towards the end he was passing only a few ounces per diem. The low specific gravity throughout is possibly in part due to the small amount of nitrogenous food given, and that feeding at any time was difficult on account of the vomiting. At no time was there any œdema. On the day before death the blood showed:

Hæmoglobin.....	90 per cent.
Red blood cells.....	4,350,000
White blood cells.....	8,000
Polymorphonuclears.....	66 " "
Small lymphocytes.....	22 " "
Large lymphocytes.....	10 " "
Eosinophiles.....	1 " "

The autopsy findings, twelve hours post mortem, are the following:

The body, though somewhat thin, is not emaciated; no abnormal pigmentation, and no œdema. On section there is a thin layer of tough, deep-yellow subcutaneous fat (atrophic). The mesentery and omentum contain considerable fat.

Peritoneal cavity. Free of adhesions; the convex surface of the left hepatic lobe is in part covered with a thin layer of friable, easily removed, recently deposited fibrin, and over the adjacent part of the right hepatic lobe, there is also some fresh fibrin. Over the convex surface of the spleen there is both recent and partly organized fibrin. The peri-splenitis is therefore an older affair than the peri-hepatitis. A little free, pale-yellow fluid containing large masses of jelly-like fibrin is found about a somewhat distended gall-bladder, but chiefly in the pelvis. No adhesions; all organs normally placed.

Pleural cavities. Free of adhesions and fluid.

Heart. Weight, 290 grams, well contracted, all chambers being almost empty. Epi- and endocardial surfaces smooth and glistening. Valves normal; myocardium rather pale but of normal consistence. Intima of aorta and pulmonary artery smooth and uniform in colour and thickness. Coronaries normal.

Lungs. Unusually pale-pinkish throughout (always lived in the country). A little hypo-stasis at the right base, otherwise the lungs are normal. Bronchial mucous membrane normal.

Esophagus. Mucous membrane intact and pale-pinkish.

Stomach. Normal in size, and its walls of normal thickness and consistence. The mucous membrane is for the most part pale and normal and is covered, especially towards the pylorus, with a thick, tenaceous, bile-tinged mucous. No ulcerations.

Intestines. Mucous membrane intact throughout.

Pancreas. Of normal consistence and on section pale.

Gall bladder. Greatly distended with dark, thick bile; the ducts are clear.

Liver. Weight, about 2,000 grams. Surface smooth except as above noted. On section, the lobules are evident and well filled with fat. The central veins normal.

Spleen. Weight, about 450 grams. The surface is covered with patchy deposits of recent and organized fibrin, the latter milky in appearance. The pulp is fairly firm as it does not come off on the knife. The Malpighian bodies are prominent, and scattered throughout are many discrete yellowish bodies of varying size up to 4 m.m., which are obviously miliary and conglomerate tubercles. The trabeculae are not abnormally marked.

Kidneys. Both are alike and together weigh 500 grams. Each is easily removed from a small amount of peri-renal fat. The surface is smooth and presents a mottled appearance, due to engorged stellate veins and many petechial hæmorrhages. The capsule strips readily, leaves a smooth surface, and on section the cut edge of the organ is sharp and not rounded off as would be the case were the parenchyma under increased tension. The cortex and medulla are clearly defined, but broader than normal. The veins stand out prominently as radiations in the medulla and throughout there are many small hæmorrhages. The glomeruli stand out fairly prominently, and many of these are congested. The pelvis, ureters, and bladder are normal.

Testes. The left is a little smaller than the right and is distinctly of firmer consistence. It is, moreover, firmer than the right and nothing can be scraped from its cut surface.

Bone marrow. That of the shaft of the femur is abundant, pale and fatty in appearance.

Lymphatic tissues. Immediately beneath the bifurcation of the trachea there is a very large gland 2.5 cm. in diameter, which, on section shows a centre of creamy yellow pus and cheesy debris, surrounded by a thin periphery of caseous tissue. The gland is so situated that it could easily press on the left recurrent laryngeal nerve, and therefore, at least in part, be responsible for the severe cough and the huskiness of his voice that was present for months before his death. The mesenteric and retro-peritoneal glands are small and not remarkable.

Microscopically—

Heart. Myocardium normal.

Lungs. A section of the hyperæmic area shows small foci of broncho-pneumonia.

A few miliary tubercles are also present.

Liver. Lobules clearly defined and contain much fat in the outer zone. Here and there a miliary tubercle is found showing a marked tendency to sclerosis towards its periphery and very little caseation in its centre. The lobules show no focal sclerosis, and there is no increase of connective tissue.

Spleen. The Malpighian bodies are large and well formed. In the pulp there is a general increase of connective tissue so that the walls of the sinusoids are very clearly defined. The trabeculae and capsule are thickened, the latter showing a deposit of recent and partly organized fibrin on its surface. The sinusoids are engorged with blood and contain numerous endothelial phagocytes filled for the most part with red blood cells. Scattered throughout are numerous miliary and conglomerate tubercles, the latter especially showing a tendency to caseate and break down. The necrotic centres are composed chiefly of pus cells and the dense connective tissue periphery contains enormous numbers of tubercle bacilli—sometimes as many as one hundred in a single field.

Pancreas. The parenchyma and insulae appear for the most part normal and there is no increase of interstitial tissue. Scattered throughout, but mostly interlobular, are small foci of cellular infiltration—chiefly polymorphonuclear. Such are usually found in the neighbourhood of small vessels, particularly the interlobular veins, which, in addition often contain masses of polymorphonuclears in the lumen and in the vessel wall. The immediately adjacent parenchyma usually shows necrosis. There is also another phase of this inflammatory process—namely, a widespread

infiltration of many of the interlobular connective tissue septa with polymorphonuclear leucocytes. In places the lobule is also invaded by a few of these cells. Minute intra-lobular hæmorrhages are also quite numerous, the whole constituting a diffuse acute inflammation.

Kidneys. The most marked feature is the enormous engorgement of the vessels throughout, changes in the convoluted tubules and the glomeruli, and finally, a great increase of connective tissue. The glomeruli are for the most part enlarged, the capillary tufts being often swollen—partly due to congestion and partly to a definite increase of intracapillary endothelium. Some glomeruli of normal or slightly diminished size show definite lobulation of the tuft resulting from connective tissue proliferation. The tuft is usually retracted from the capsular wall leaving a considerable space, which, though often the result of tissue fixation, is often filled with red blood cells and a few leucocytes. Rarely there is proliferation of the capsular epithelium. A very great increase of interstitial tissue throughout separates the convoluted tubules. The lumina of the latter are usually dilated and the epithelium cuboidal or flattened—especially where there is much intratubular exudate or hæmorrhage. Occasionally a tubule is devoid of epithelium but the latter is often found in the cross section of probably the same tubule lower down, for here one may find two layers of epithelium firmly adherent to a central mass of erythrocytes, pus or debris. Smooth, glassy, eosin-staining casts, so constant a feature of chronic nephritis, are rare, as most of the casts are finely granular, being composed chiefly of cellular debris. In a few tubules there is a frank purulent exudate, usually in an area where there is extensive infiltration into the interstitial tissue. The tubular epithelium in many places is in part or totally destroyed while occasionally the cells are swollen and contain much fat in finely divided particles. Some of the degenerated cells are seen to be invaded by polymorphonuclear leucocytes. No mitosis of the epithelial cells is to be seen, though many tubules show such longitudinal and lateral attenuation of flattened cells bridging a space between cuboidal cells, that there may have been here some attempt at regeneration. The collecting tubules are mostly filled with debris, blood, pus or granular casts, and in most of them the epithelium is intact. Rare miliary tubercles are also present throughout. The interstitial tissue is somewhat œdematous, greatly increased in amount and infiltrated everywhere with varying amounts of lymphoid cells. Where there are foci of acute

inflammation, the cells are chiefly polymorphonuclear. Furthermore, the latter are often seen entirely filling greatly dilated tubules, apparently having been attracted by the debris therein. There is nothing remarkable about the larger vessels.

Testicle (left). The parenchyma of the body of the organ shows most extensive destruction for there remains for the most part only shrunken, necrosed vestiges of tubules in which no cellular structure can be made out. The interstitial tissue is a little increased and is infiltrated with pus cells which are also often seen within the lumina of destroyed tubules. Towards the periphery of the organ there are intact tubules, so that the infection has involved chiefly the centre of the organ. The epididymis appears normal. In the adventitia of vessels accompanying the cord there are foci of lymphocytes but the vas deferens itself is normal.

Adrenals. Normal.

Bone marrow. Composed almost entirely of fat; otherwise normal.

Lymph glands. That found at the bifurcation of the trachea in an advanced state of destruction, shows tuberculosis. Those taken from the retro-peritoneal region also contain a few miliary tubercles.

DIAGNOSIS

1. Acute and chronic diffuse nephritis.
2. General miliary tuberculosis, probably arising from the oldest and most extensive focus—the enlarged sub-tracheal gland.
3. Hypostatic pneumonia.
4. Acute peritonitis.
5. Acute pancreatitis.
6. Acute and chronic orchitis (mumps).

In view of the post-mortem findings, it seems highly probable that the prolonged and unusually severe cough and huskiness of voice were caused by pressure upon the left recurrent laryngeal nerve, exerted by the enlarged sub-tracheal tubercular gland. No light, however, is thrown upon the peculiar rash and symptoms that appeared on the thirteenth day—though it may be explained as of the nature of anaphylaxis.

It will be remembered that when a protein, such as that of horse serum is injected for the first time, the phenomenon of serum sickness may appear after several days—usually seven or eight. Either the individual is naturally abnormally hypersensitive to this protein in even small amounts, or the tissues have, as a result

of the inoculation, become from day to day more sensitive to the protein, until finally there is a definite local and constitutional reaction, presumably due to a residuum of the same protein that has not yet been excreted. Where the individual has already been sensitized by an injection months or even years before, a much more rapid and severe reaction may ensue. Again, where there is extensive destruction of epithelial cells, following, for instance, a severe burn, it is almost certain that a poisonous substance or substances are formed in the burned area, for it had been observed that in narcotized experimental animals, if the burned tissue is removed at once, the animal will recover, whereas, if allowed to remain in situ for some hours, death ensues. Furthermore, if burned skin is transplanted to a healthy animal, the latter shows symptoms of poisoning. If the circulation is shut off from a burned area, no intoxication occurs. The urine of cases of burning is highly toxic and when injected into animals it is said to produce symptoms quite similar to those characteristic of anaphylaxis. Heyde states that small burned areas sensitize an animal to further injections of burned tissue, and he with Vogt believe, that in some cases of burning, especially in those ending fatally twelve to thirteen days later, death may be the result of anaphylaxis, due to protein made foreign by the action of heat.

The exact nature of the toxin in anaphylaxis is not known, though the work of Vaughan and his co-workers seems to indicate that any protein is capable of being split into a toxic and a non-toxic fraction, the former being probably one and the same for all proteins, inasmuch as it may be obtained by boiling almost any protein in caustic soda. The toxic fraction from whatever protein derived, will produce all the symptoms of anaphylaxis. Vaughan's hypothesis is that a specific enzyme is produced whenever a foreign protein is introduced into the blood stream; that this enzyme will quickly split a second dose of the same protein, the toxic fraction of which will produce all the symptoms of anaphylaxis.

Therefore, if it is a fact that tissues altered by heat may produce toxic proteins capable of sensitizing the host and later on causing anaphylaxis, that the toxic group is the same, or nearly so, for all proteins as Vaughan believes, may it not as well be possible for a powerful necrogenic substance, such as corrosive sublimate, to so alter the proteins of the cells that it destroys, that such altered proteins are now foreign to the body and so can produce both sensitization and finally anaphylactic shock? This may explain in our cases the sudden temperature and rash, etc., on the thirteenth day following the poisoning.

A CASE OF RHEUMATIC FEVER WITH PURPURA, ŒDEMA
OF THE GLOTTIS, ETC.

LIONEL M. LINDSAY, M.D.

Montreal

JEAN McF. was eleven years old when admitted to the Children's Memorial Hospital, complaining of pain and swelling in the ankles, knees, shoulders, etc., with swelling of the face and neck and a hæmorrhagic eruption over the left shoulder and both elbows.

Jean had been born in Scotland and came to Canada at the age of five. She had always been a healthy child with the exception of measles, pertussis, and varicella. She had never suffered from rheumatism, growing pains, chorea, or tonsilitis, nor had she shown any evidence of a so-called hæmorrhagic diathesis with the following exception. At the age of seven months, after vaccination, both feet and legs became swollen and discoloured with deep red patches. The condition lasted about one week, during which time she screamed a great deal as if in pain.

Three days prior to admission she had been suddenly taken ill with what appeared to be an ordinary attack of rheumatic fever. Sodium salicylate was ordered in four grain doses every four hours by her physician, who two days later referred her to the hospital.

Examination on admission showed a rather thin, pale though well developed girl. She could answer questions intelligently, but seemed decidedly dull and "heavy". The most striking feature was the marked swelling of the left side of the face and neck, which pitted on pressure and prevented her from opening her eye. Scattered over her body were several areas of ecchymosis, deep-red, mottled and sharply circumscribed, not raised and not fading on pressure. These areas varied in size from a five-cent piece to the palm of the hand. The largest areas were on the left side of the face, the left shoulder, behind both knees, and over the sacrum. There was a deep-seated "bruise" on the dorsum of the left foot, tender to touch. Arthritis was present in the left

Read at the fifth regular meeting of the Montreal Medico-Chirurgical Society. December 7th, 1917.

shoulder, right knees and elbow. These joints were painful, tender and swollen.

The heart was somewhat enlarged in all directions (4 c.m. to right—9 c.m. to the left). The action was rather rapid but regular. There was a loud rough systolic murmur heard best at the apex and transmitted round the axilla to the back. There were no signs of cardiac weakness.

There were no enlarged lymph nodes, but the tonsils were rather large and the pharynx congested. There was a small hæmorrhage in the gum below the left incisors.

The urinalysis was negative—no albumin, no blood, no casts.

Diagnosis: Rheumatic fever, purpura, carditis.

Sodium salicylate (5 gr. q. 4 h.) was administered.

Little change was noted in her condition until the afternoon of the following day when she suddenly began to gasp for breath. In a few minutes her condition became desperate, she was unable to draw her breath and was becoming deeply cyanosed. In short she was suffering from acute œdema of the glottis. She was rushed to the operating room and tracheotomy performed, which gave immediate relief.

From that time the œdema gradually diminished, although the subcutaneous hæmorrhages continued to appear in crops chiefly on the legs and thighs. These spots were much smaller than the original, varying in size from a five-cent to a ten-cent piece.

By the end of the first week in the hospital her condition was greatly improved. The tracheotomy tube had been removed, and her temperature which had usually been over 101° was now below 100°. She was able to read and to feed herself, and on the whole was very comfortable, although she still had some pain, tenderness and swelling of the left foot, and left hand and wrist. There was also a crop of herpes at both corners of the mouth. The original ecchymoses were beginning to fade, though still a deep fawn in colour.

Her recovery was rather slow but steady. She remained very thin and pale for many weeks, and on one occasion is reported to have had an eruption of erythema multiforme with increase of cardiac symptoms. But these were of short duration, and on the whole her condition has remained very satisfactory. Cardiac hypertrophy and mitral insufficiency are of course, still present, but her heart responds well to moderate exercise.

The salient points of this case are the arthritis, with carditis,

marked purpura and œdema which involved the glottis. But at no time did she have any abdominal crises, or hæmorrhages from any of the internal organs, such as would occur in Henoch's purpura. Apparently then this was a case of what the English writers call Purpura Rheumatica.

The question was raised, early in the disease, whether the purpura (including the œdema) might not be due to an idiosyncrasy to sodium salicylates, as this drug, like iodides and mercury, is known to cause purpura. Reference was made to a case published by Dr. Shepherd (*Jour. Cutan. & Genito Urin. Dis.*, vol. xiv, 16, 1896), and the two cases were found to correspond to a certain extent, but not sufficiently to convince us that the two cases were of the same pathogenesis. Furthermore on one occasion when the patient came to the out-patient department with slight fever and vague pains I prescribed aceto-salicylic acid, twenty grains a day, for one week, without causing a reappearance of purpuric symptoms.

In conclusion I should like to express my appreciation to Dr. H. B. Cushing for permission to study and report this case, and to Dr. Gordon Campbell for his interest in photographing the skin lesions, to Dr. J. T. Rogers whose prompt action saved the little girl's life.

At the annual meeting of the Stratford General Hospital, which took place on March 1st, it was decided that the hospital year should end on September 30th, instead of December 31st, and that the annual meeting in future should be held in December. The admissions to the hospital during the year numbered five hundred and fifty-one.

Editorial

LEGISLATION FOR PROTECTION AGAINST VENEREAL DISEASE

SINCE August, 1914, there has been a great awakening of the public conscience in many directions, and the importance of matters connected with the health of the people is receiving more general recognition. It therefore seems timely for the launching of some great movement against the ravages of gonorrhœa and syphilis.

The prevalence of prostitution and sexual promiscuity in all countries makes syphilis and gonorrhœa endemic amongst the population. In 1901 the "Committee of Seven" reported that there were apparently 162,372 patients suffering from venereal disease in New York city alone. The same proportion exists in other North American cities. Conservative authorities estimate that from 51 to 60 per cent. of our adult male population have had gonorrhœa, of whom about 20 per cent. became infected before they were twenty-one years of age. Among women gonorrhœa, though more severe, is less common than among men, the proportion of men to women being about fifteen to one. It is shocking to learn that almost one-third of the reported cases of gonorrhœa in a large American city occurred in married women, to whom infection had been conveyed by their husbands. Nine hundred and eighty-eight cases of marital infection were reported, and the unreported cases were believed to be six times as numerous. We may add to this the ghastly array of about five hundred children. A disease that attacks more than half our young men and that affects thousands of children and hundreds of thousands of women, a disease that enters the family almost entirely through illicit sexual contact, a disease that may be transmitted long after the

patient thinks himself or herself well, a disease transmitted to the wife from a prostitute via the husband, from wife innocently carried to her child, a disease that is the cause of most of the major gynæcology of to-day, that causes fifty per cent. of involuntary sterility, that makes chronic invalids of many, and kills not a few, a disease that destroys the power of procreation in men as well as in women, is indeed one of the most serious perils—if not *the* most serious—of our war-ridden countries of to-day.

Although Canada and the United States are probably further in the rear than any other great nations in the world in their efforts to control venereal disease as a national problem, they are fortunate in having the way paved by epoch-making movements such as those of the Scandinavian countries, and by the studies of the Sydenham Royal Commission in Great Britain. Progress in this country is much slower, hampered by peculiarities of mental outlook, and considerations very different from those which have controlled the thought of Europe. The effect of finding the problem of gonorrhœa and syphilis bound up with the subject of social evils has been to perpetuate in popular thought an association which simply blocks the way to any solution of the public health problem. It is one of the most significant features of this great movement now on foot all over the world, and they have finally adopted the direct route, and are attacking syphilis and gonorrhœa as diseases and not by way of their association with prostitution. It cannot be too strongly impressed that a reasonable conservation should temper the ardour of reformers, or more harm than good will be done by the collapse and failure of ill-considered special legislation. Freak legislation and fool schemes are the familiar preliminaries which precede the grim onset of a real attack supported by true public sentiment. Typical examples of such premature legislation may be found in the setting up of the Wassermann test as evidence of fitness for marriage in some States, and in the efforts of certain official

agencies to enforce the reporting of syphilis and gonorrhœa by name. The many social remedies may well be boiled down to three main types, viz.—First, individual prevention; second, methods of dealing with prostitution; third, a moral educational campaign.

To discuss fully the relative merits of the three would require a volume. The first we may easily pass by. Segregation and reglementation of prostitution is employed with notable failure in France and Germany. It fails in theory by not quarantining the males, in practice by omitting the lewd housemaid, the shop girl and the errant widow. The moral campaign of education to old and young has its spurs to win. It is very full of promise. It is hard to see how such education can fail to save many innocents from venereal diseases and moral woes far worse. Repeated sifting of the facts by investigations has gradually crystallized into fairly definite form the essentials of a programme for controlling venereal disease.

First the provision of universally available good treatment at the expense of the State, if necessary, for the diseases in question.

Second, provision by the State of efficient means of recognizing those diseases at the earliest possible time, and greatest possible certainty.

Third, suppression of quack practice of all kinds.

Fourth, compulsory measures and penalties obliging patients to receive and continue treatment until cured.

Fifth, reporting of cases of sexual diseases to the health authorities.

Sixth, moral and educational prophylaxis, and the vigorous suppression of prostitution.

Saskatchewan is the first of our provinces to include venereal diseases amongst maladies classified as contagious. All cases of syphilis, gonorrhœa, and chancroid in future must be reported within three days to the Commissioner of Public Health by the physician in attendance. In reporting the

cases the physician is required to mention certain particulars regarding the patient as to his age, marital relations, occupation and probable source of contagion. The name of the patient, however, will not be stated unless the said patient fails to return for treatment within thirty days. This measure makes it possible at least to ensure that cases once recognized will receive proper treatment, and it is hoped that every physician will coöperate with the Saskatchewan Government in its effort to restrict the spread of these diseases. In the Province of Ontario an active campaign is being conducted against venereal diseases, and an enquiry into the subject is being made and governmental action will probably be taken during the next session of its Legislature. Let us hope that all the other provinces of the Dominion will follow suit, or better still, that the Dominion Government will follow suit, and later perhaps it can be made possible to have all the provinces under the direct supervision of a central Dominion Health Board.

THE following suggestions in regard to the establishment of municipal hospitals were made at a conference between Hon. George P. Smith, the provincial secretary of Alberta, and a delegation representing the rural municipalities of that province.

1. In making boundaries for any hospital area, that municipal boundaries may be disregarded.

2. Location of hospital: The provincial secretary shall make the decision as to location of hospital; to that decision, any twenty-five ratepayers may appeal to the public utilities board whose decision will be final.

3. The decision to organize under the Hospital Act will be by referendum vote of the entire area and the majority vote shall rule, providing that a municipal unit voting adversely may be permitted, under exceptional circumstances, to withdraw from a particular hospital area on condition that it is to become a portion of another hospital area.

In the petition for a referendum vote, instead of requiring twenty-five applicants from each municipality, a clause is substituted which permits of the securing of signatures equivalent to twenty-five from each municipal unit no matter where they may be secured. It was also recommended that the flat rate be used as a means of taxation for building and operating these hospitals.

THE second *Bulletin of the Association of Medical Officers caring for Tuberculous Soldiers in Canada* was issued by the Military Hospitals Commission on February 28th. It is the eighth bulletin published by the Commission and is a continuation of Bulletin No. 7, which appeared in January. The latter contained a review of the work accomplished during 1917 in the treatment of tuberculous soldiers. At the end of that year military patients suffering from tuberculosis to the number of 3,075 had been cared for by the Commission; of these 1,358 had been discharged and 1,717 were still undergoing treatment on December 31st. This bulletin also contained a valuable report on the vocational training of the tuberculous soldier, written by Mr. T. B. Kidner, the officer in charge of that branch of the work. The substance of this article has already been given in the JOURNAL.

Bulletin No. 8 gives the number of soldiers undergoing treatment in the various sanatoria under the direction of the Commission as 1,348, of whom nine hundred and eighty-six had been overseas. The out-patients numbered one hundred and seven. Nine patients died and one hundred and eighty-five were discharged. This bulletin contains excellent reports on the work being done in the provinces of Saskatchewan and Nova Scotia. Captain L. G. Houle points out that until the Earl Grey Sanatorium was opened in Regina in July, 1917, that province was without accommodation for cases of tuberculosis outside of beds in the general hospitals. Since then one hundred and forty-six admissions have been made to the sanatorium, of whom eighty-seven have been discharged and five

have died. Of those discharged, twenty-seven were improved, nineteen were quiescent, ten apparently arrested, two unimproved, twenty-two were classed as "untreated" since they were resident less than twenty-one days in the institution, six were doubtful cases, and one non-tuberculous. The provincial sanatorium at Qu'Appelle had been commenced before the war, but after August, 1915, its construction was discontinued. A part of the original plan, however, has recently been completed and the hospital now has a capacity of seventy-five beds. As the accommodation provided at the military institution, the Earl Grey Sanatorium, was insufficient, arrangements were made for the admission of soldiers to the provincial institution, where there are at present twenty-two military patients. Captain Houle states that the men are more content at Qu'Appelle than in Regina, where the distractions of the town render it difficult to enforce discipline. He also points out the need for a system of following up discharged cases of tuberculosis in that province.

Captain Miller contributes a report on the situation in Nova Scotia, where in order to provide the necessary accommodation for military patients, two pavilions and one infirmary have been added to the provincial sanatorium at Kentville. A vocational training building, which was completed in October, 1917, has proved inadequate and is now being enlarged. In June of last year it was necessary at short notice to provide accommodation for one hundred and thirty-six tuberculous soldiers upon arrival at Halifax. A colony of tents was therefore laid out in connexion with the sanatorium and these later were replaced by three temporary wooden buildings.

The bulletin also contains abstracts from a booklet written by Mr. Denham, clerk to the Brighton Insurance Committee, England, in which the proposal is made that self-supporting colonies should be established for the treatment and care of tuberculous soldiers, the facilities eventually to be available for the whole population.

The Association

PRELIMINARY PROGRAMME—COMBINED MEETING

HAMILTON, ONTARIO

Monday, May 27th, to Saturday, June 1st, 1918.

**Ontario Medical Association, Canadian Medical Association,
Canadian Association for the Prevention of Tuberculosis,
Canadian Public Health Association, Ontario
Health Officers' Association**

Monday and Tuesday

Canadian Public Health Association and Ontario Health Officers' Association

President's address, (Canadian Public Health Association)—
"A Plea and a plan"—W. H. Hattie, Halifax.

President's address (Ontario Health Officers' Association)—
H. W. Hill, London.

"The public health nurse"—J. A. Baudouin, Lachine.

Paper (title to be announced)—M. M. Seymour, Regina.

"Good public health service in small towns and rural municipalities"—J. J. Harper, Alliston.

"Hints on rural health administration"—J. W. S. McCullough, Toronto.

"The control of an outbreak of diphtheria"—W. C. Allison, Toronto.

"The trail of the medical vampire"—Frederick Paul.

"Health insurance"—Charles J. Hastings, Toronto.

"The venereal disease problem"—Gordon Bates, Toronto.

"Why is it worth while to establish sewerage in a small town?"
—F. A. Dallyn, Toronto.

"Interpretation of water analysis"—H. M. Lancaster, Toronto.

"Mental hygiene"—Clarence M. Hincks, Toronto.

Symposium on Child Welfare.

Chairman's address—Alan Brown, Toronto.

"Child welfare in war time"—Isaac Abt, Chicago.

"Progress in child welfare work in Europe"—Grace L. Meigs, Washington.

"The results of three years' work in the department of child hygiene, Toronto"—George Smith, Toronto.

"The medical student in his relation to infant and child welfare work"—Richard Bolt, Cleveland.

"The management of a child welfare week in small cities and towns with results"—Mary Power, Toronto.

Round table discussion and subscription luncheon

Alan Brown, chairman.

Wednesday, 9.00 a.m.

Canadian Association for the Prevention of Tuberculosis,

Ontario Health Officers' Association and Canadian Public Health Association

Secretary's report—G. D. Porter, Toronto.

"The rôle of the health officer in the control of tuberculosis."—H. W. Hill, London.

"Heliotherapy by the Rollier method as applied to surgical tuberculosis with lantern demonstrations"—John H. Pryor, Buffalo.

"President's address"—J. A. Machado, Ottawa.
Social and public health aspects of tuberculosis.

10.00 a.m.

Ontario Medical Association

General Business Session.

10.30 a.m.

Canadian Medical Association

General Business Session.

2.15 p.m.

Ontario Medical Association

"President's address"—John P. Morton, Hamilton.

2.30 p.m.

Canadian Association for the Prevention of Tuberculosis:

Symposium on the Diagnosis and Treatment of Tuberculosis:

Differential diagnosis—J. S. Pritchard, Battle Creek.
Sanatorium treatment—A. F. Miller, Kentville.
Artificial pneumothorax—D. C. Parfitt, Gravenhurst.
Tuberculin treatment—J. H. Elliott, Toronto.

8.00 p.m.

**Ontario Medical Association, Canadian Public Health Association
Canadian Medical Association**

General Session:

The returned soldier problem.

Thursday, 9.00 a.m.

Ontario Medical Association and Canadian Medical Association

Meeting of Sections.

2.00 p.m. and 8.00 p.m.

General Session:

Address in Medicine—Lewellys F. Barker, Baltimore.
Address in Surgery—Charles Mayo, Rochester.
Address in Obstetrics—(to be announced).
Address in Pediatrics—I. A. Abt, Chicago.
Address on the Ear—Isaac Jones, Philadelphia.

Friday, 9.00 a.m.

Canadian Medical Association and Ontario Medical Association

Meeting of Sections.

2.00 p.m.

Symposium on Intra-Cranial Pressure:

Medicine—W. F. Hamilton, Montreal.
Surgery—A. E. Garrow, Montreal.
Physiology—J. J. R. Macleod, Cleveland.

8.00 p.m.

General Sessions

Saturday, 9.00 a.m.

Hamilton Clinical Day.

In the section of medicine amongst others the following have consented to take part:—L. Rowntree, Minneapolis; Thaddeus Ames, Beatrice Hinkle and W. Gordon Lyle, New York; I. Chandler Walker, Boston; Thomas McCrae, Philadelphia and W. G. MacCallum, Baltimore. On eye, ear, nose and throat, Casey Wood, Chicago; Walter Parker, Detroit; John Wheeler, New York; Joseph Beck, Chicago; and H. Halsted, Syracuse; R. F. Ridpath, I. H. Jones, Philadelphia; G. B. New, Rochester, Minn. In surgery, Dr. McGuire, Buffalo; C. E. Hyndman, St. Louis; Donald Guthrie, Sayre; and Dr. Henderson, Rochester.

Regarding the work in the sections, the general principle will govern in all that there will be very few papers, but it is the expectation of the Committee that each paper presented will promote a very elaborate discussion so that in a sense each will represent a symposium. The writers of the papers are asked to present a synopsis which should be ready and in the hands of the Committee before March 25th.

It is proposed to have in addition to the regular programme of sections and general sessions, an innovation in the nature of a "Round Table Discussion" on a matter of vital interest to the profession as a whole. This will be arranged for late in the day when the regular programme is finished. Accommodation will be limited and all seats reserved.

A personal conference in Ottawa with Surgeon-General Fotheringham of the Militia Department and others interested in the Returned Soldier Problem, resulted in developing the plans for the Symposium on this subject for Wednesday evening in a very satisfactory manner.

Plans are also under way for the presentation of a most interesting collection of scientific exhibits. There will be a pathological exhibit which will include a very fine collection of museum specimens from the McGill University Museum, and will be in personal charge of Dr. Maude E. Abbott, of Montreal; also an exhibit from the Babies' Hospital, of New York, of a number of specimens

illustrating pneumonia in children and an extremely interesting exhibit from the National War Museum of Canada, being the first consignment of war specimens received from the front, shown by special permission of Surgeon-General Fotheringham. It is hoped also to obtain similar exhibits of equal interest from the museums of Queen's Medical College, Kingston, of Toronto University, and the Western University of London. There will be a series of demonstrations of clinical laboratory procedures, including those of special interest to the general profession, such as the Wassermann reaction, the colloidal gold functional kidney test, dark field spirochæta, and the preparation of serums and vaccines for therapeutic use.

For the x-ray exhibit, plates are requested to be sent in by men interested in this work. There will be a daily informal demonstration and a lantern will be available for those wishing to use it.

There will be shown daily from four to six, moving pictures on medical and surgical subjects including subjects of interest to the general practitioner.

The American Medical Association have offered the use of their charts, illustrations, and literature, relating to the propaganda for reform as carried on by that Association.

The Local Committee also wish to announce that it is their wish to carry out the programme and all entertainments with greatest respect for war conditions. While there will be no formal receptions or entertainments, this Ambitious City will go the limit of its capacity in its efforts to make the visiting members welcome, comfortable, and satisfied.

RAILWAY RATES

The usual reduced rates have been arranged on all the Canadian roads. These special rates may be obtained by doctors attending the meeting, and by members of their families accompanying them.

In order to take advantage of these rates it will be necessary for the physician when starting, first, to purchase a single first-class ticket (which must cost not less than 50c.) to place of meeting, and second to obtain from his ticket agent a standard certificate properly filled in and signed by the latter. This must be presented to the General Secretary of the Association when registering at the meeting. It will be filled in by him and viséd by a special agent of the transportation companies, who will attend for this purpose

and who will collect the sum of 25c. for each certificate examined. The presentation of this form properly filled in and vised will entitle the holder to a return ticket to his home either free of charge or at two thirds, or one third, the regular first-class fare, depending on the number attending the meeting.

From points east of Fort William, Ontario, tickets must be bought between May 23rd and May 29th, inclusive, and the return journey may be made up to and including June 5th, 1918. From points West of Fort William, and Armstrong, Ontario, tickets must be bought between May 22nd and 25th, inclusive; from British Columbia between May 19th and 22nd, inclusive. Certificates for the return journey to the west will be honoured at Hamilton up to and including June 5th. A thirty-days' extension may be secured by the additional payment of one third the full fare from place of meeting to starting point. Stop-overs will be granted holders of these extended tickets.

We would point out to our members that the above special rates apply as well to the boats of the Canada Steamship Lines, as to the railways.

It is hoped that our members will note that it is important to fulfil all conditions mentioned above, and it should be emphasized that the greater the number attending, the less will be the cost of railway transportation.

Pacific Coast and Province of British Columbia

Since the publication of the March number we have been advised by the Transcontinental Passenger Association that this year they cannot grant reduced fares on the Certificate Plan described above. Those from Pacific Coast points and British Columbia who wish to attend the meeting will therefore have to avail themselves of the regular nine months' excursion fare, which may be purchased any day throughout the summer and which is good for return up to any time within nine months from date of purchase. The cost of this ticket is about one fare and a third.

Obituary

LIEUTENANT-COLONEL JOHN McCRAE

THE following letter of condolence on the death of Lieutenant-Colonel John McCrae has been forwarded to the JOURNAL by Colonel H. E. Snell, A.D.D.M.S., Canadians, as an expression of feeling from the Medical Officers of the Canadian Army Corps in France:

Resolution of sympathy to Mr. and Mrs. McCrae from the Medical Officers attached to the Canadian Corps in France.

"The medical officers attached to the Canadian Corps learn with deep regret of the death of Lieutenant-Colonel John McCrae, who in the early part of the war was attached to the Canadian Corps, and did such good service as medical officer to a Canadian Field Artillery Brigade.

"We realize what a great loss the Canadian Army Medical Corps and the medical profession of Canada have suffered, but feel how much greater the loss to you, his father and mother, must be.

"We extend to you our sincerest sympathy, in the hope that the knowledge that you have given your son in such a great cause, may in some measure be a comfort to you and help you in your sad bereavement.

"February 2nd, 1918."

DR. F. W. DYKES of La Riviere, Manitoba, was unfortunately burned to death on February 13th. It is not known how the fire occurred, but at the time Dr. Dykes was alone in the house and it is thought that he was probably asleep and was asphyxiated. His charred body was found among the ruins of the house. Dr. Dykes graduated from the Manitoba Medical College in 1906 and since then had been in general practice at La Riviere. He was well liked and respected and his tragic death cast a gloom over the entire community. A widow and one son survive him.

DR. JOHN S. BOOTH, who was in practice in Montreal, died from injuries sustained when he was struck by a street car upon alighting from one going in the opposite direction. As he was pinned beneath the car, it was impossible to do anything for him

until the front of the car could be lifted up. When this had been accomplished he was taken at once to the hospital but died shortly afterwards. Dr. Booth, who was fifty-three years of age, graduated from McGill University in 1887 and had a large practice in Montreal. He leaves a widow and five children.

DR. LOUIS G. McKIBBON, who had been in general practice in Toronto for twenty years, died on March 4th, in the fifty-third year of his age. Dr. McKibbon was born at Teesdale, Ontario, and graduated at Trinity Medical College in 1886. He practised for a short time at Blackstock before going to Toronto. He was attached to the staff of the Western Hospital at Toronto, and was a member of the Masonic craft. A widow, two daughters and three sons survive him.

THE forty-first annual report of the Victoria General Hospital, Halifax, was tabled in the House of Assembly by the Hon. H. E. Armstrong in February. The report gives the number of patients admitted during the past year as 1,910 and the total number of cases treated as 2,068. One hundred and twenty-five deaths took place. The income during the year amounted to \$26,976.93 and the expenditure was \$122,273.22. The average daily cost of maintenance was \$2.19 per patient. During the year Dr. J. Frank Mack was appointed dermatologist in succession to the late Dr. James Ross. Dr. A. R. Cunningham was appointed assistant in the eye, ear and nose department, and Dr. M. A. Macauley in the department of gynaecology.

Miscellany

News

MARITIME PROVINCES

A BILL to consolidate and amend the Act relating to Public Health was introduced in the Nova Scotia House of Assembly on February 28th, by Mr. W. Chisholm, the member for Antigonish.

THE Halifax Board of Control on February 25th passed a resolution in favour of building an isolation hospital, which should cost about \$27,000, of which \$10,000 would be contributed by the Relief Commission.

It is understood that the Bill to amend the Public Health Act of the province of New Brunswick, which is to come before the legislature in all probability during the present session, contains a clause relating to the control of venereal disease.

THE annual report of the St. John Branch of the Victorian Order of Nurses gives the number of visits paid during the year 1917 as 7,885. The cases attended numbered 1,004, nine hundred and eighty-one of which were new patients. Among these were two hundred and ninety-eight infants, twelve chronic cases, three hundred and seventeen obstetrical cases, forty-five gynæcological cases, and one hundred and sixty-two surgical cases. The number of cases of tuberculosis is given as three.

QUEBEC

AN enquiry into the municipal affairs of Montreal was recently made by the Bureau of Municipal Research and a report submitted to the city council. Speaking of the board of health the report says that the board, consisting of the mayor and seven aldermen, two being physicians, and the medical officer of health, has not performed any function of value and has met only five times since May, 1911. It therefore cannot be considered to have carried out the duties entailed in its advisory capacity to the medical officer of health, and it is recommended, therefore,

that this board, as at present constituted, be abolished. The report praises the excellent work of Dr. Seraphin Boucher, the medical officer of health, and recommended that he be permitted to choose the members of a board of health from among citizens who are interested in matters relating to public health. The report also recommends the appointment of an assistant medical officer of health.

At the annual meeting of the Sherbrooke Hospital Board in February, Mr. Mackinnon, the president of the hospital, stated that the per diem cost of maintenance had increased from \$1.97 to \$2.35 for each patient and that the institution was in urgent need of financial assistance.

DURING the past year 1,074 infants were treated in the St. Justine Hospital at Montreal, and medical attention was given to nine thousand children in the out-door department.

ONTARIO

A BILL on venereal disease was introduced in the provincial legislature by the Hon. I. B. Lucas on February 25th, and had its second reading on March 5th. The Bill has been drawn up along lines suggested by Mr. Justice Hodgins in the report recently submitted by him to the government. After the second reading of the Bill, it was decided to place the matter in the hands of a committee consisting of Dr. W. Jacques of Haldimand, Dr. Forbes Godfrey of West York, Dr. A. W. Nixon of Halton, Dr. J. B. Martyn of Lambton East, Dr. E. Jessop of St. Catharines, Dr. J. M. Robb of Algoma, Mr. V. A. Sinclair of Oxford, Mr. C. McKeown of Dufferin, Mr. C. McCrae of Sudbury, Mr. Thomas Marshall of Lincoln, Mr. S. Carter of South Wellington, Mr. S. Ducharme of North Essex, Mr. J. C. Elliott of West Lambton, and the Hon. I. B. Lucas.

THE 1916-1917 report of the Hamilton Board of Health gives the number of deaths caused by the following diseases as: pneumonia, one hundred and thirteen; heart failure, sixty-three; apoplexy, forty-seven; tuberculosis, sixteen; diphtheria, twenty-seven.

GRANTS to the amount of \$52,160 for the Hospital for Epileptics at Woodstock were included in the supplementary estimates

passed by the provincial government in February. It is the intention that the sum of \$40,000 shall be expended in the erection of two additional buildings.

At a meeting of the Perth County Medical Association in February last, it was decided that the usual fees, instead of the reduced fees charged last year, should be charged to the wives and dependents of soldiers.

Last year one hundred and sixty-five patients were admitted to the Brantford General Hospital. The number of deaths was six, and fourteen births occurred. The annual report presented to the board of governors draws attention to the need for a larger and better equipped isolation building, the present being inadequate in every way.

MANITOBA

An urgent appeal for assistance was made in February to the Winnipeg City Council by a delegation from the General Hospital, who requested that a grant of \$60,000 be made to enable the hospital to meet its most pressing obligations.

The annual meeting of the Grace Hospital, Winnipeg, was held on February 11th. The work of the institution, which is under the direction of the Salvation Army, is divided into three departments: the main building is divided into private, semi-private and public wards; the wing is devoted to rescue work; and the annex is used for the accommodation of children whose mothers are in hospital. The objects of the institution are to provide care and medical treatment for friendless girls and women, and to care for mothers among the deserving poor; a number of beds are reserved for the accommodation of patients who can afford to pay for treatment. During 1917, eight hundred and fifteen maternity cases were admitted to the institution.

ALBERTA

It was decided at a meeting of the Calgary Hospitals Board on February 20th, that a request should be made to the provincial government that the Hospitals Act be amended. The Act as at present constituted provides that a sum of money equivalent to the cost of maintaining indigent patients from outside municipalities may be collected from the municipalities, but the regu-

lations of the rural municipalities, towns and villages provide that the sum of one dollar a day may be collected from the towns and villages, and seventy-five cents from the rural districts, whereas the present cost of maintenance is over two dollars a day for each patient, towards which the provincial government grants twenty-five cents. A committee was also appointed to approach the government with the request that a hospital for incurables be erected in the province.

ABOUT two years ago an institution for mental defectives was opened in Regina. The accommodation is limited to thirty beds and at present there are twenty-eight patients in the institution, whose condition varies from imbecility to that of the high-grade feeble-minded. An effort is made to correct destructive propensities and train habits of regularity in the imbeciles, the majority of whom, however, are bed-ridden or at least suffer from bodily disability. The feeble-minded are all women and they are taught housework, needlework and similar duties; these cases, of course, will require permanent supervision.

ARMY MEDICAL SERVICES

THE Bar to the Military Cross has been awarded to Captain Frederick W. Lees, C.A.M.C., of Toronto.

THE Military Cross has been awarded to the following:

CAPTAIN G. M. FOSTER, C.A.M.C.

CAPTAIN A. S. PORTER, C.A.M.C.

CAPTAIN H. C. DAVIS, R.A.M.C., of Schomberg, Ontario, and formerly in practice in Vancouver.

THE Military Medal has been awarded to Sergeants F. S. Butler and M. E. Martin; Corporal R. S. Greenaway; and Privates T. Canning, F. J. Miles, S. J. Patterson, H. H. Riley, J. M. Ritchie, F. A. Smithers, and C. J. Tomlinson.

It is believed that Captain Frank Park and Captain W. R. Haight, of Toronto, have been released in a recent exchange of prisoners with Germany. It will be remembered that they were taken prisoner in 1916 at Zillebeke.

LIEUTENANT-COLONEL KENNETH DOUGLAS PANTON, C.A.

M.C., of Vancouver, is now in command of No. 14 Canadian General Hospital, which is stationed at Meads, near Eastbourne, in England. Lieutenant-Colonel Panton has been on active service since shortly after the commencement of the war and was in command of No. 5 General Hospital at Salonica.

THE following promotions in the Canadian Army Medical Service are gazetted:

Temporary Major C. F. L. Haszard from Canadian Light Horse transferred to the Canadian Army Medical Service.

To be temporary Majors: Temporary Captains W. L. Shannon, F. G. Logie, J. C. Wickham, A. T. Henderson, A. H. Pirie, C. A. McDiarmid, R. B. Robertson, G. F. Boyer, L. M. Rice, J. H. McPhedran. Temporary Captains (acting Majors) J. W. Hutchinson, H. C. Burgess, and W. H. Lowry.

Temporary Captains to be acting Majors: R. J. Gardiner, G. W. Hall, H. W. McGill, M.C., W. H. Scott, M.C., A. B. Chapman, M.C.

To be temporary Captains: S. E. Beech, G. B. Wiswell, temporary Major A. Stirling from New Brunswick Regiment, and temporary Lieutenants D. R. Finlayson, and D. S. McCurdy.

As was stated in the last issue of the JOURNAL, No. 1 Canadian Stationary Hospital has been converted into No. 13 Canadian General Hospital and is now stationed at Hastings, England. While in the East this hospital was stationed in Lemnos Island (Dardanelles), Egypt, and Salonica, having served six months in France and six months in England before going East. Of the original staff, only three remain, viz. Lieutenant-Colonel E. J. Williams, D.S.O., of Sherbrooke, Quebec, the officer in command; Major J. G. W. Johnson, of Montreal, second in command; and Honorary Captain and Quartermaster F. E. Currey of Calgary.

Canadian Literature

ORIGINAL CONTRIBUTIONS

Canadian Practitioner and Review, February, 1918:

Poliomyelitis	Capt. H. W. Hill.
Radium in tuberculosis of the skin	W. H. B. Aikins.

The Canada Lancet, February, 1918:

Unexpected abdominal findings . . . W. H. Harris.

Combination treatment of syphilis by
medicine and electric massage . . . Sir James Grant.

Some work with minor anæsthesia . . . H. O. Howitt.

Book Reviews

GENITO-URINARY SURGERY AND VENEREAL DISEASES. By EDWARD MARTIN, A.M., M.D., F.A.C.S., professor of surgery University of Pennsylvania; and others. Tenth edition, 893 pages, illustrated with 422 engravings and 21 coloured plates. Price \$7.00. Publishers: J. B. Lippincott Company, Philadelphia, London, and 201 University Building, Montreal.

This, the tenth edition of a well-known volume, appears long after the ninth, but fully justifies the necessary delay. Over two-thirds of the book is devoted to urology, the remainder to syphilis. It well represents the most practical views of the day including short discussions on vaccines and serums; tests of renal function; high frequency dessication; and on laboratory diagnosis of syphilis.

The chapters on symptomatology and diagnosis are full and well illustrated; the operative work is written in full detail and has many illustrations, while a large amount of space is devoted to treatment, the whole rendering the book especially valuable for both practitioner and student.

Medical Societies

THE KINGSTON AND FRONTENAC MEDICAL SOCIETY

THE society held its regular meeting January 14th, Dr. Mylks, the president, in the chair.

Professor T. L. Patterson read a paper on the "Emergency functions of the spleen in the light of recent investigations", a synopsis of which is here given.

Some of the older ideas in regard to the function of the spleen were first discussed. It is thought by many, and especially by

the clinicians, to be an organ for the destruction of the red blood cells, but many physiologists are more apt to take the stand that since the red blood cells have lost their nucleus, they are on the way to destruction before they even reach the spleen, and that the destruction of these cells takes place in the blood stream, or any part of the circulation, there being probably no special organ or tissue in the body charged with the function of destroying these cells. The liberated hæmoglobin, due to this disintegration and dissolution in the blood stream, is carried to the liver, and there excreted as bile pigment. By calculating the output of iron in the fæces, and determining the amount of hæmoglobin in the blood, we find that after splenectomy in dogs, there is an increase in the output of iron from 11 to 29 mgm. with a marked diminution of hæmoglobin in the blood. The author of the paper exhibited one of his original charts showing these results.

The spleen may also be concerned in the manufacture of uric acid, and according to several investigators there is an existing relationship between it and the pancreas, whereby the spleen is supposed to furnish a substance of proteolytic importance in the formation of the pancreatic juice. Others claim that there is also an existing relationship between the spleen and the liver, while a more recent investigator has brought forth proof that the spleen produces a hormone substance which stimulates the secretion of gastric juice. The opinions of different investigators have varied in respect to the effects produced after splenectomy on the blood picture, but the majority of results usually show a slight but transitory polycythemia which does not amount to more than an increase of one to two million reds and not lasting over five to seven days. Then there is likely to be an anæmia which may persist, or, as in the larger percentage of cases, a normal red count. In the white blood cells there is usually a slight post-operative leucocytosis followed by a permanent lymphocytosis of varying degree with an increased number of mononuclear leucocytes and eosinophiles. There will be no increase in polymorphonuclears unless there is some infection, as that resulting from pus in the wound. The author of the paper here presented another original chart obtained from a splenectomized dog which showed the above results.

Another one of the more recent ideas is that of Stradomsky, who claims that the spleen has a twofold hormone action on the bone-marrow. One of these he claims has an inhibiting action

on the production of red blood cells in the bone-marrow, while at the same time, the other exerts a stimulating action to increase the destruction of the red cells, the normal balance in the blood being brought about by these two factors. When the spleen hormone is absent, the bone-marrow produces unlimited quantities of reds but there is a deterioration in their quality. After splenectomy, injection of spleen extract is likely to give results confirming the action of the spleen, while spleen extract, in the treatment of anæmia, seems to contradict his views which he attempts to explain on the ground of biological reactions. However, it is quite probable that the spleen may furnish a substance of internal secretion which is important in the control of the bone-marrow in the production of the red cells, and if such a phenomenon exists it may rightly be considered as one of the emergency functions of the spleen.

The organ may be concerned in the manufacture of red blood cells. In foetal life we know this to be a normal function, but in adult life all indications of such a function normally disappears, but it is a known fact, that after severe anæmias (pernicious anæmia) and in rabbits after the injection of saponin, the spleen may again take on its hæmatopoietic function and the venous sinuses become crowded with the cells of the marrow type, thereby giving an emergency function in the body of the greatest importance.

The seat of antibody formation has been proven rather conclusively to take place, not in the blood stream, but in the hæmatopoietic tissues of the body and especially in the spleen, as has been shown by experiments on dogs. When two such animals are selected and the spleen removed from one while the other is left normal, as a control, it is found that if goat's blood is injected into these two animals in equal amounts, which acts in each case as antigen, and then the rate of appearance and concentration of immune bodies determined, the normal dog with a spleen produces more antibodies than the splenectomized animal, the former acting on goat's corpuscles with a dilution of 1/98,304 after the fourth day, while the latter only acts after the twelfth day with a dilution of 1/6,144. This latter animal is also more susceptible to pathogenic organisms. Hence the organ has the power of producing antibodies which may likewise be considered one of the emergency functions of the spleen.

For many years it has been considered that the spleen was not a vital organ, and that its removal from the body was without

serious injury to the animal, since the splenic function could be so easily taken over by some other organ or tissue in the body. However, a recent communication by Luckhardt before the annual meeting of the American Pathological Society at Minneapolis, December 26th-29th, 1917, on splenectomy in the young of cats, seems to point rather conclusively to the fact that the spleen is a most vital organ, at least in the young. He worked on very young cats, selecting animals from the same litter and those which compared well in weight. All the splenectomized cats died young; the normals or controls nearly doubled their body weight, while the splenectomized lost in body weight. The adrenals in the splenectomized cats were nearly twice the size and weight of those in the normal, which indicates an intimate relationship between the spleen and the adrenal glands. Our knowledge of the spleen is as yet somewhat limited. We are just beginning to learn of its great importance to the body, and although not as well acquainted with its internal functioning as in the case of many of the other ductless glands, such as the adrenals and more recently the thyroids, whose active principle, known as "thyroxin", has just been isolated by Dr. Kendall of the Mayo Clinic and is soon to be placed on the market for the treatment of thyroid insufficiency, yet we may expect as great, or even greater, discoveries from investigations on the spleen.

DISCUSSION: Dr. W. T. Connell: 1. My understanding of the action of the spleen in the disintegration of the red blood cells, is that in the spleen, the red cells are "marked" for destruction, probably by addition of a hæmolytic ferment-like or sensitizer substance, which then leads to the disintegration of these cells in any part of the circulation or their phagocytosis by macrophages. This has seemed to me to be the explanation for the removal of spleen advocated by some in pernicious anæmia cases during the improvement stage or following a successful blood transfusion. No doubt this function is shared by endothelial and lymphoid cells of the lymphatic glands and lymphoid tissue and this accounts for the fact that after extirpation normal hæmolysis is not greatly disturbed.

2. That the spleen is one of the important organs of the body in the development of antibodies against infection is, I think, generally agreed, and the pulp cells are actively phagocytic. Evidence of these functions are afforded by the common enlargement of the spleen in nearly all the acute infections, and in the

readiness with which bacteria or protozoa are picked out of the circulation by the splenic cells and thus are readily demonstrated in the spleen in fatal infections.

Dr. Third: Gustav Mann (New Orleans) has shown that 13,900,000 corpuscles per cubic millimetre is the maximum carrying power of the blood plasma.

In a patient recently under observation who had lived for some years at considerable altitudes the average of four counts was 8,200,000 per c.m. The viscosity was enormously increased. It seemed marvellous to me that such blood could pass through the capillaries. Before leaving the mountains he said he was of a "bad colour", presumably cyanosed, that he felt "dopey" most of the time, and suffered almost daily from headaches. Five weeks after his return to normal levels the count was only slightly above 6,000,000 and his general condition was good.

We have been taught to regard this polycythæmia as compensatory, as in fact, but another example of "adaptation", and the case cited would appear to support this view. I do not think there is any case on record where this condition has merged into true erythræmia.

Dr. Wm. Gibson: Could the polycythæmia after splenectomy not be accounted for by the absence of the splenic hormones?

Professor Patterson, closing: I am fully aware of the phagocytic activity of the splenic cells and the remarkable work they accomplish in cleaning up the bacteria to which Dr. Connell has called our attention. In reply to his views on the destruction of the red blood cells by the spleen, I must take the stand of the physiologist, that they meet their fate in the blood stream or anywhere in the circulation, even before they reach the spleen. Of course the best proof we have that the spleen destroys the erythrocytes, is the histological fact that in teased preparations of the spleen tissue or of the lymph-glands, certain large cells (macrophages) contain red blood cells in their cell substance in various stages of disintegration. These large cells probably ingest the red blood cells, selecting those, presumably, that are in a state of physiological decline. Against this idea, a number of objections may be raised. Leucocytes with ingested red blood cells are not found frequently nor so constant as one would expect. It has also been found that the blood of the splenic vein contains no hæmoglobin in solution, which indicates that no considerable dissolution of red blood cells is taking place in the spleen. Neither does complete extirpation of the spleen seem to lessen materially

the normal destruction of the erythrocytes, if we measure the extent of bile pigment formed in the liver, since hæmoglobin is the mother-substance from which the bile pigments are derived, but I cannot absolutely say, that the splenic function of destroying these blood cells which so many clinicians believe in, may not be taken over after splenectomy by some other organ or tissues in the body. The production of antibodies by the spleen is most interesting and well founded and of great importance to the body.

I agree with Dr. Third that polycythæmia leads to a marked increase in the viscosity of the blood and that death results when the 13,000,000 mark is much exceeded. As the viscosity of the blood increases with the increased polycythæmia, of course the oxygen carrying capacity of the blood is also diminished, and in order to meet the demands of the body tissues the blood would have to circulate more rapidly, but this is impossible, due to greater resistance from viscosity.

As to Dr. Gibson's question in regard to the cause of polycythæmia after splenectomy being due to the absence of the splenic hormones, I think this is a very reasonable conclusion for one to draw, provided Stradomsky's results can be relied upon, but of course his work needs verification.

MONTREAL MEDICO-CHIRURGICAL SOCIETY

THE fifth regular meeting of the society was held Friday, December 7th, 1917, Dr. A. E. Garrow, president, in the chair.

CASE REPORT: Dr. L. M. Lindsay exhibited a case of rheumatic fever with purpura and œdema, a report of which appears on page 352 of this number of the JOURNAL.

DISCUSSION: Dr. G. G. Campbell: I was asked to see this case at the time tracheotomy was done and when the purpura was at its height. It seemed to me then, and I still think, that the eruption was not of the type one gets with rheumatic purpura. There are several points against it to which I think one should give prominence. Purpura occurring in connexion with rheumatism is generally symmetrically distributed; it does not occur, as in this case as you can see from the photographs, in the dependent parts of the body. In the curve where the folds of the buttocks come together there is almost a straight line where the margin of the hæmorrhage begins, and about the shoulders and back the same thing is true. In most purpura cases the limbs are much more affected than the trunk and the distribution is

fairly symmetrical. It therefore gave me the impression that this was a case in which the salicylate of soda had caused some change in the composition of the blood so that it passed through the walls of the vessels wherever there was pressure, such as we see occurring often in certain cases of urticaria. The other case Dr. Lindsay referred to was a man who had rheumatic iritis in the care of Dr. Stirling. He was put on small doses of the salicylate of soda and developed hæmorrhages. The salicylate was continued and ulceration occurred. The hæmorrhages were very large and very regular and showed little evidence of symmetry, except so far as they could be induced by pressure. From the view of the dermatologist this case of Dr. Lindsay's was much more like a salicylate of soda eruption than purpura rheumatica.

Dr. A. H. Gordon: It seems to me that one is very apt to make the name rheumatism a cloak for a great many conditions, of the character of which we have no real knowledge. One sees a great many cases of rheumatic fever with the syndrome of multiple migratory arthritis, fever, endocarditis, sweating, etc., and in none of these cases that one sees so frequently do we see any such things as purpura, iritis, rheumatic eyes, rheumatic sore throat, rheumatic pains in the back, etc. When one does see purpura as a rule it is not associated with a typical rheumatic fever, neither is iritis, nor erythema nodosum, and therefore it seems to me that the burden of proof rests on any one who wishes to call such conditions rheumatic. It does seem to me that it is quite open to question whether any of the aforementioned conditions have any right to be referred to as rheumatic.

Dr. H. B. Cushing: I saw this case on admission and it was hard to avoid the conclusion that she had acute rheumatism; there was fever, polyarthritis, endocarditis, and all the other cardinal signs. In addition she had this most unusual rash which was totally unlike any I had seen of the so-called rheumatic purpuras. I was inclined to welcome the suggestion that the condition was due to the salicylates. However, after salicylates had been stopped and the purpura disappeared, two weeks later she had a recurrence of purpura without any salicylate. She was also given salicylates on another occasion when there was no rash, without it recurring. This to my mind was strongly against alteration of the blood by the soda salicylate.

PATHOLOGICAL SPECIMENS: Series by Dr. W. J. Scott.

1. Fractured crest of the left ilium with thrombosis of left iliac vein; pulmonary embolism. The patient had fallen a dis-

tance of twelve feet and the fracture was treated on admission to hospital. Ten days after, patient insisted upon leaving hospital and while dressing fell to the floor dead from pulmonary embolism.

2. Lympho-blastoma with its origin in the spleen; secondaries in the glands of the cervical region and hilus of the spleen.

DISCUSSION: Dr. C. K. P. Henry: The first case mentioned by Dr. Scott was a patient in Dr. von Eberts' ward and one of the symptoms was a temporary hæmaturia. At autopsy it would appear from the swelling and the callus, and the damage there, that it would be possible for the ureter as it crossed over the brim of the pelvis, to have been temporarily injured or contused and would probably have been the cause of the hæmaturia. The man presented the ordinary symptoms of this fracture but it is rather unusual to get such a displacement of such a large portion of the crest without any accompanying injury of the rami or the bones in the front. The man was intoxicated, and difficult to handle all the time he was in hospital and insisted upon getting up against the will of the attendants.

Dr. Lauterman: May I ask how this metastasis in the second specimen travelled from the spleen to the neck without involving any of the other organs on the way.

Dr. A. E. Garrow: What was the relation between this injury and the condition of the iliac vein? I was not clear whether it had been injured at the time of the accident or subsequent to the slipping of the bone by his movement.

Dr. A. R. Pennoyer: I would like to ask whether in this first specimen there was any evidence of thrombo-phlebitis because it appears to me that a condition so extensive as this would have given some evidence in the leg, œdema, etc.

Dr. W. J. Scott: These metastases may travel through the blood stream by their own amœboid movement or by a tumour infiltrating a blood vessel, or they may travel by the lymphatics. In this case it would seem that it was by the blood stream. As to the bone case the internal iliac vein showed no evidence of violence but the branches were thrombosed and there was evidence of a thrombosis of the vein itself. There was no evidence of infection.

PAPER: The paper of the evening was read by Dr. H. B. Cushing on, "Recent cases of epidemic meningitis in Montreal," and discussed by Drs. Gurd, Lindsay, Hall, Campbell, and Gordon. Dr. Cushing replied.

Medical Societies

CANADIAN MEDICAL ASSOCIATION:—President—Dr. A. D. Blackader, Montreal. President-elect—Dr. H. B. Small, Ottawa. Acting Secretary treasurer—Dr. J. W. Scane, 836 University Street, Montreal.

ACADEMY OF MEDICINE, TORONTO:—President—Dr. D. J. Gibb Wishart. Secretary—Dr. J. H. Elliot, 11 Spadina Road. Treasurer—Dr. J. H. McConnell.

ALBERTA MEDICAL ASSOCIATION:—President—Dr. D. G. Revell, University of Alberta, Edmonton South. Secretary-treasurer—Dr. T. H. Whitelaw, Medical Officer of Health, Edmonton.

Annual Meeting, Edmonton, 1918.

ASSOCIATION OF MEDICAL OFFICERS OF THE MILITIA:—President—Lt.-Colonel A. T. Shillington, A.M.C., Ottawa. Secretary—Captain T. H. Leggett, A.M.C., Ottawa.

ASSOCIATION OF MEDICAL OFFICERS OF NOVA SCOTIA:—President—Dr. George E. DeWitt, Wolfville. Secretary—Dr. W. W. Hattie, Halifax.

BRANT COUNTY MEDICAL SOCIETY:—President—Dr. E. R. Secord, Brantford. Secretary—Dr. M. N. Faris.

BRITISH COLUMBIA MEDICAL ASSOCIATION:—President—Dr. J. Glen Campbell, Vancouver. Secretary—Dr. H. W. Riggs, Vancouver.

CALGARY MEDICAL ASSOCIATION:—President—Dr. H. A. Gibson. Secretary—Dr. J. W. Richardson. Treasurer—Dr. J. V. Follett.

CANADIAN ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS:—President—Dr. J. A. Machado, Ottawa. Secretary—Dr. George D. Porter, Ottawa.

CANADIAN HOSPITAL ASSOCIATION:—President—Dr. H. A. Boyce, Belleville. Secretary—Dr. J. M. E. Brown, Toronto.

CANADIAN PUBLIC HEALTH ASSOCIATION:—President—Dr. J. W. Hattie, Halifax, Nova Scotia. Secretary—Dr. J. G. Fitzgerald, University of Toronto. Annual Meeting, Hamilton, May, 1918.

CENTRAL SOUTHERN ALBERTA MEDICAL SOCIETY:—President—Dr. J. S. Murray, Okotoks. Secretary-treasurer—Dr. G. E. Learmonth, High River.

COLCHESTER-HANTS MEDICAL SOCIETY:—President—Dr. J. W. T. Patton, Truro. Secretary—Dr. H. V. Kent, Truro.

DUFFERIN MEDICAL SOCIETY:—President—Dr. Rooney, Orangeville. Secretary—Dr. Smith, Shelburne.

EDMONTON ACADEMY OF MEDICINE:—President—Dr. C. U. Holmes. Secretary-treasurer—Dr. E. L. Garner. Library, 12 Credit Foncier Building.

ELGIN COUNTY MEDICAL ASSOCIATION:—President—Dr. F. F. McEwen, Aylmer. Secretary-treasurer—Dr. W. F. Cornett, St. Thomas.

FRASER VALLEY MEDICAL SOCIETY:—President—Dr. DeWolfe Smith. Secretary—Dr. D. F. Carswell.

HALDIMAND COUNTY MEDICAL ASSOCIATION:—President—Dr. Hopkins, Dunnville. Secretary—Dr. Courley, Cayuga, Ont.

